MODEL AIRPLANE NEWS

11th Year of Publication

MARCH, 1940
20c

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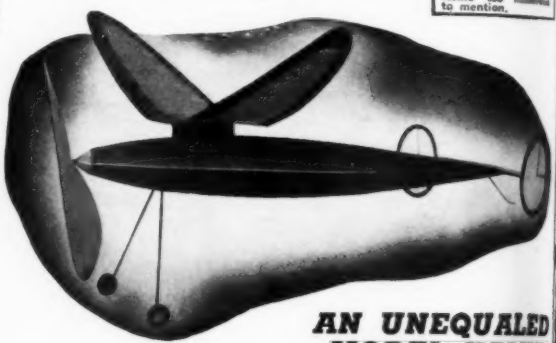

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Fresh designs engineered with BURD 1940 ideas. Colossal in size! Terrific in value! This new series is unsurpassed! Only BURD production methods could make such values possible. See them at your dealer's.

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36" Howard DGA8

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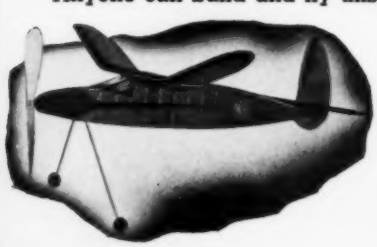

BURD

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Mr. Dealer: Is *your* model department showing a profit? Are model sales good, bad, or just "so, so." Give your model sales a "shot in the arm"! Get these BURD bargains for your customers TODAY! Carry the entire BURD line and watch the increased sales. Write or wire for our proposition.

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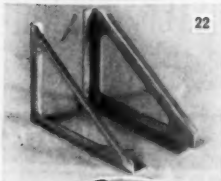
32. SUPER-CYCLONE will fly any kit now on the market—WITH POWER TO SPARE—yet light enough for small jobs.



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BORE 15/16 **STROKE** 15/16
CUBIC DISPLACEMENT .65 **CU. INCHES**

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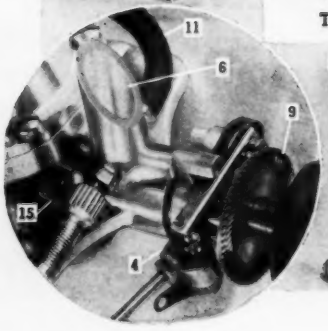

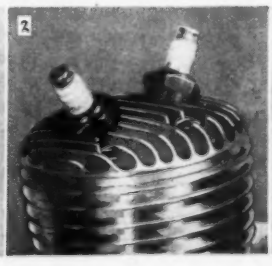

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ORDERS WILL BE FILLED IN ROTATION

Model AIRPLANE News

11th YEAR OF PUBLICATION

VOL. XXII *No. 3*

Edited by Charles Hampson Grant

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MARCH, 1940

NOTICE

Published Monthly by JAY PUBLISHING CORP., Mount Morris, Illinois.
Editorial and General Offices, 551 Fifth Avenue, New York City.
Jay P. Cleveland, President. N. Howard Williamson, Secretary.
Jay P. Cleveland, Advertising Manager, 551 Fifth Avenue, New York, N. Y.
Entered as second-class matter Dec. 6, 1934, at the post office at Mount Morris, Ill., under the act of March 3, 1879. Additional entry at New York, N. Y.

Price 20c a copy. Subscription price $2 a year in the United States and its possessions; also Canada, Cuba, Mexico, Panama and South America. All other countries $2.50 per year.
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A beautiful high performance Class "B" rubber glider. Span 20". Kit E-5011 complete **25c**

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CLEVELAND WAKEFIELD GULL

Span 45", length 36", weight 8 oz. (may be made lighter where certain contests require). A polyhedral design with a terrific climb and a sailplane glide. Keep your eye on this model in future Wakefield contests. It is also eligible in any N. A. A. fuselage contests such as the Moffet, Stout, etc. Kit complete except rubber (eliminated so that you can always put in the freshest possible rubber for winning prizes), colored all red, Kit E-5015 ..... **$1**

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The One They Have to Beat to Win

This flying masterpiece (exclusive with Cleveland) was designed, tested and contest-proved by Dick Korda, America's No. 1 model airplane builder. Winner in many contests, including the Detroit Nationals. Span 46"—23 oz. complete, but may be lightened to 20-21 oz. Beautiful red trimmed, yellow (or gray) flyer. Wing fitted with slip-off cradle in event of crash. Complete Kit GP-5005 includes everything necessary (except power unit) only **$2.95**

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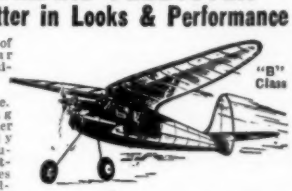
Pace Setter in Looks & Performance



"B" Class

Sister ship of our popular Cloudster. Advanced type Class "B" monoplane. Special wing design, together with highly streamlined fuselage and lifting tail, makes this an excellent contest model. Yellow and blue trimmings. No prettier commercial type gas model ever developed. Span 42½". Complete Kit GP-5007 (except power unit). Only **$2.50**

Another Cleveland World's First!

FIRST $1.00 GAS MODEL

Baby Playboy! [A Gas Model But May Be Flown with Rubber Power]

(except for motor. It looks just like illustration). Class A Design, 33" span, 8 oz. (with motor) 144 square inches of area. Kit GP-5008 includes everything (except power unit) **$1.00**

Playboy Jr.—Class "B"

Finest of its type, yet no harder to make than a "Wakefield" model. A perfect "step-up" design to serious gas model work, yet one which will give a better-than-average chance of winning contests for both beginners and "old timers" alike. Color, yellow and black. Span 46". Complete Kit GP-5006 includes everything necessary (except power unit) only **$2.50**

CLEVELAND GAS MODEL DRAWINGS

Complete Drawings for these Gas Models—Each 75c except Baby Playboy which is 35c

Microdyne Mighty Atom is the motor for "Baby" Playboy.

Send Your Order NOW for One of These Popular CONTEST MOTORS

For CLASS A

Mighty Atom $12.50
New Ohlsson "19" 14.50

For CLASS B

Ohlsson "23" $16.50
The new "Brownie"

For CLASS C

Sky Chief ..... $ 6.95
Brown, Jr. Model D.... 12.50
Brown, Jr. Model C.... 18.50
Brown, Jr. Model B.... 21.50
Dennymite Standard 15.85
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(Mention upright or inverted)

Build These Gas-Powered RACE CAR MODELS

20" Speed Demon, friction drive, all metal parts finished $16.50
"Rocket" front wheel steering, front wheel drive 19.00
Mercury Midget, all cast aluminum rear wheel drive 23.50
Alexander C.A.R., all cast aluminum, easy to assemble, front wheel drive 25.00
ALL ABOVE KITS WITHOUT MOTOR
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Get your Copy Now! Contains 3 great lines of C-D airplanes, also 25c airplanes for beginners and larger ready-to-fly models. Also model railroad equipment and toy trains, 10c up in C-D and HO gage; a wide variety of gas model airplanes and all well-known makes of gas engines; gas and "rubber driven" supplies; also "general" supplies for railroad and innumerable model uses; race cars, hand tools, and a wide variety of ship kits and fittings. Nearly everything a real model builder could wish for within its pages for only one thin dime. Send for it today! (NO FREE COPIES.)

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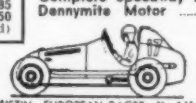

AUSTIN—EUROPEAN RACER Kit AU-4

4½"—Bright Blue with White Numerals

Build These Tiny Scale Models

Six Winners—2 Indianapolis, 2 Europeans, All 6 Kits, 60c plus 15c postage.

Ordering Instructions: Send check or money order—cash at your own risk. Include 15c for packing charge and postage under $1.50. C.O.D.'s accepted only when $2.00 deposit accompanies order to insure acceptance of delivery. Shipments outside U.S. add 10%—over $10.00 no additional charge. For P.P. Special Delivery in U.S. add 25c.

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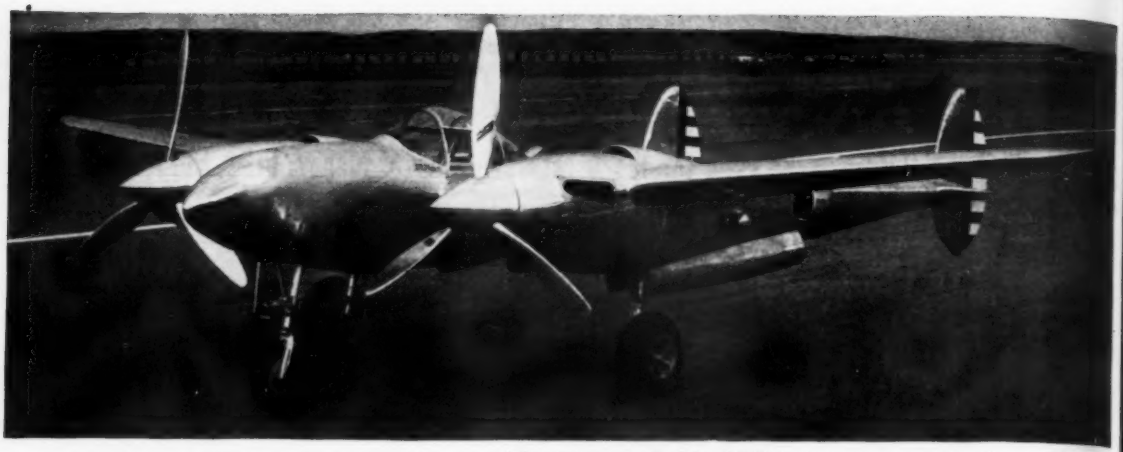
4508D17 Lorain Ave., *"World's Finest Models—Since 1919"* Cleveland, Ohio, U. S. A.



The 400 m.p.h. Lockheed XP-38 interceptor pursuit plane. (Globe)

Planes become obsolete quickly. What is to be done with these old type pursuit ships?

10,000

By DOUGLAS J. INGELLS

THEY fired him because he had the nerve to tell them what was wrong. He was the "Bad Boy" of the army. The navy dubbed him "Mad Mitchell" because he dared slander its battleships. But his foresight was well-placed, for that "dream idea" he once fostered is now on its way to reality. Uncle Sam is going to build the mightiest air force in the world!

If he were alive he could tell the world "I told you so." But the man, who lost rank and friends because he believed in the airplane as a military weapon of first importance, will never see the WINGED MIGHT which his government plans to build. Only his words of admonishment shall echo in the ears of those who take steps toward increasing America's air power.

"We need a larger air force. . . . The airplane is the greatest form of national defense. . . . The air corps should be a separate military unit, apart from the army and navy. . . . Planes can sink battleships. . . . They will be able to span oceans. . . . Armies will be wiped out by aerial bombs. . . . Cities will fall. . . . The United States is not isolated from war in the air."

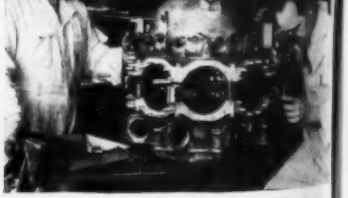
Those were the words which General William Mitchell, one-time chief of the American air service, shouted to his superiors. But they failed to listen, and his reward for continuing the fight was demotion in rank. Yet today, almost fifteen years after he was retired as director of the air service, war department officials shout the same warning to a changed world that listens intently and willingly for it knows now the words of this "rash" army officer, who dared be different, were not spoken as hearsay.

Sometime within the next five years American citizens will spend upwards to $2,000,000,000 for the purpose of building an air force that will be superior to any nation's. The strength of this new Air Armada, from all indications, will ap-

These new army Douglas bombers must be kept in good order at all times. (Acme)

Carburetors need careful checking and adjustment from time to time

Propellers must be checked for flaws and the variable pitch mechanism overhauled



Motor parts must undergo microscopic examination periodically for flaws or cracks

Gassing up an army O-47 observation plane. (Kulick)

Gen. William Mitchell, former Chief of the U.S. Army Air Corps. His foresight leads us to air supremacy

PLANES TO SERVICE

AFTER THEY ARE BUILT—WE MUST FACE OUR GREATEST PROBLEM

proximate ten thousand planes for the army and navy—bombers, torpedo-planes, pursuit ships, scouting planes, flying boats, attack planes, transports—every tactical division of the army air corps and the navy's air fleet will receive added units to build up its strength.

All of this is the direct result of the Czechoslovakian crisis of 1938. The words of Hitler's Field Marshal, General Wilheim Goering—"Germany's Air Force is superior to any in the world"—sent fear into the hearts of English and French citizens. Fear of air raids, bombs and gas. They knew the German leader had spoken the truth. The planes which Hitler had been building during these recent years (they were supposedly commercial planes) had suddenly become armed war machines capable of striking quickly and deadly at the Island across the channel, and the country just beyond the border.

That same fear reached across the Atlantic to America. Perhaps it was not as strong here, for at present thousands of miles of ocean protect this country from invasion. But planes fly faster and farther than they did during the last war and oceans have become mere lakes to the modern airplane. Bombers CAN span the Atlantic. The sudden realization that New York was not entirely safe from the possibility of an air raid caused that fear to grow. America should build her air force "just in case." This was the general opinion of the American citizens. They made it emphatic by saying, "Look at England. Look at France. Without air power they were helpless against Hitler."

Washington felt the same way. Officials of the War Department and the President himself, convinced now more than ever before, that the airplane is of vital importance to our national defense, talked preparations for a new and mightier air force for Uncle Sam.

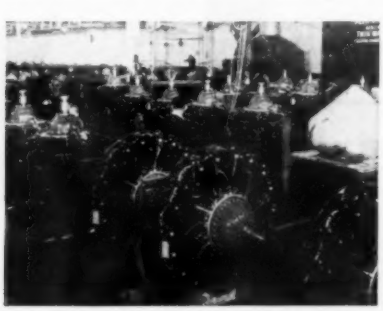
The words of Mitchell echoed again as Assistant Secretary of War Louis Johnson proclaimed, "We need more planes. . . . We must meet the tremendous pace that the rest of the world is setting. . . . America's supremacy in the air is in danger. . . . We must double, treble, yes, quadruple our present air force with the best airplanes that money can buy. . . ."

"America's Air Supremacy" is a debatable phrase for it bears a positive and negative meaning. U. S. air supremacy today is based on superior equipment. There is little doubt that American made airplanes are not superior to those of foreign nations. The increase of export trade in military airplanes to other countries stands as proof of American craftsmanship. But in number of planes America ranks sixth in the world; Russia, Germany, Italy, France, England all stand far ahead of this country.

For years now the money set aside for air corps' appropriations has gone into development and research. The belief that *"experimentation builds efficiency; efficiency builds superiority,"* has been evident among those who have authorized the spending. Perhaps, they were right. If our planes can fly higher, faster

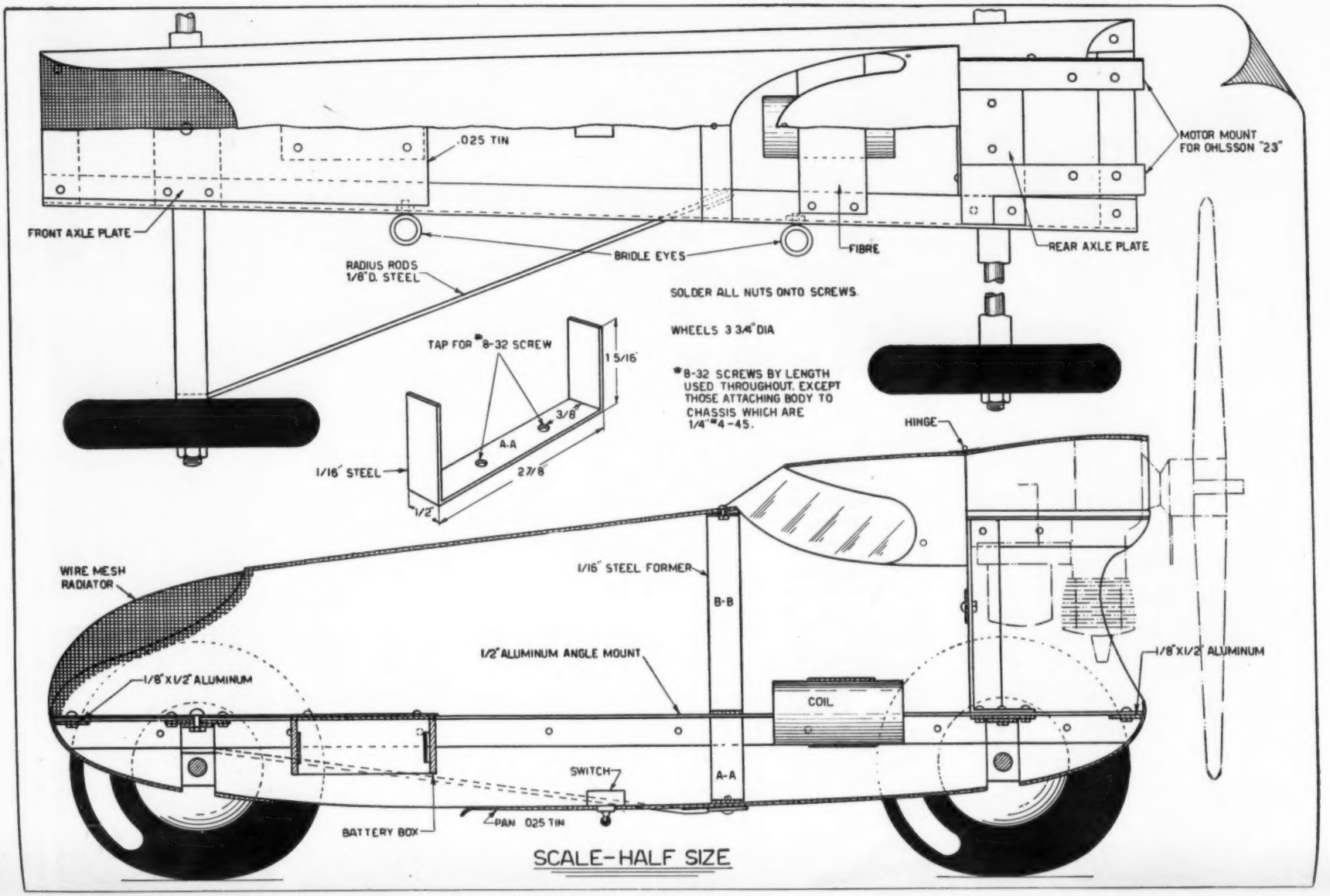
(Continued on page 38)

Mounting an overhauled motor in this attack plane is a precise operation



The expansion program keeps this motor plant busy making hundreds of engines

Careful adjustment of instruments for long range flying is essential



SCALE-HALF SIZE

Driven by an air screw powered with a model gas motor, no complicated transmission is required

HOW TO BUILD THE AIRMOBILE

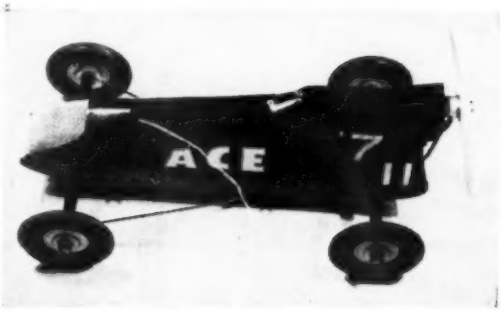
A Racer That Will Keep Pace With Anything on the Model Race Track—It May Be Easily Constructed at a Low Cost

By ALAN ORTHOF

WITH the rapidly increasing popularity of gasoline driven model racing cars, the model builder is offered an opportunity to display his skill in a new and thrilling sport. Weekly, tiny racers are "burning the track" throughout the country, setting new records by the gross and winning handsome trophies and cash prizes for their builders and designers.

Unfortunately, this thrilling sport has been somewhat hindered by the fact that only few could compete due to the cost of the tiny racers; a single car representing an investment of about $50, including engine.

Wishing to enter the auto model classics run at the New York World's Fair last summer, but being somewhat financially embarrassed, (model airplane writers and designers usually are) "yours truly" hibernated for several weeks trying to figure out a solution to his problem. Result . . . . . a propeller driven racer costing less than half the sum of the gear driven jobs.



It will attain a speed of 60 m.p.h. and may be "tethered" to run in a large circle like a full scale race car.

Builders possessing gasoline engines will find the cost of the car to be about five dollars.

Designed to run on a 1/7 hp. engine, the "ACE" is the result of a series of experimental cars constructed and tested to "hold its own" in competition with any gear driven car.

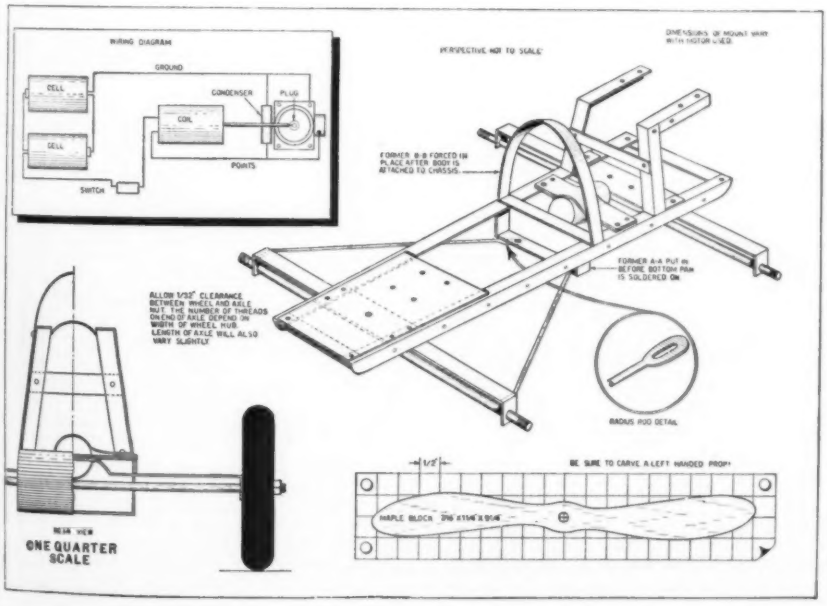
Forgetting for the moment that the car was designed for economy, let's analyze the factors responsible for the auto's excellent showing in competition.

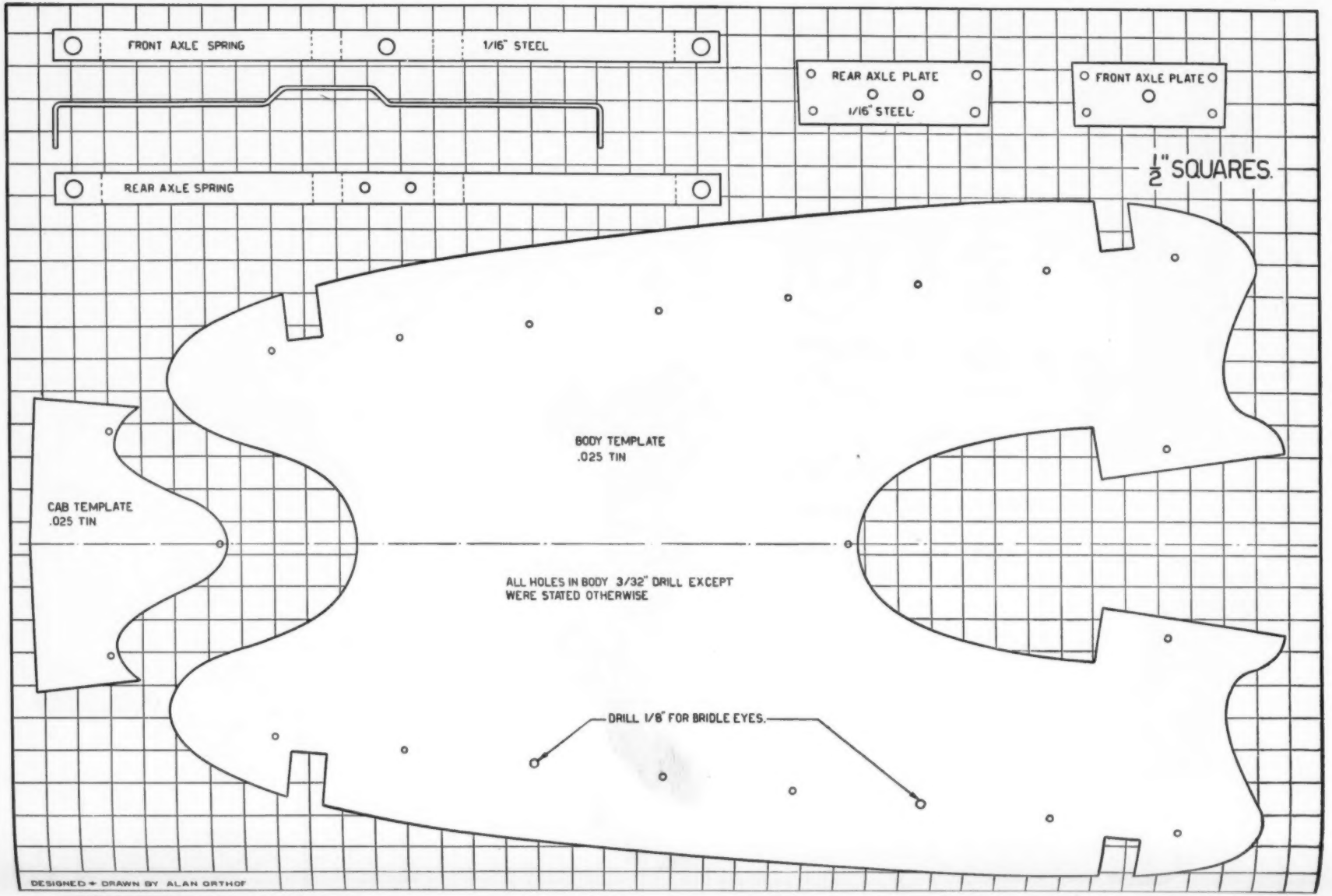
First, in racing at top speed, the gear driven autos jump off the track, losing traction and speed every time they are off the ground; and as they are off the track about fifty per cent of the time it is easy to understand why a great deal of their speed is lost. However the ACE in jumping off the track encounters less resistance and while being in the air tends to increase its speed.

Second, in the gear driven auto, a great deal of power is lost within the gears and the transmission. This has been overcome in the propeller driven car and maximum efficiency is obtained from the engine.

Third, starting the propeller driven car is much easier than the gear driven job, thus enabling the modeller

(Continued on page 52)




FRONT AXLE SPRING
1/16" STEEL
REAR AXLE PLATE
1/16" STEEL
FRONT AXLE PLATE
REAR AXLE SPRING
1/2" SQUARES.
BODY TEMPLATE
.025 TIN
CAB TEMPLATE
.025 TIN
ALL HOLES IN BODY 3/32" DRILL EXCEPT
WERE STATED OTHERWISE
DRILL 1/8" FOR BRIDLE EYES.
DESIGNED + DRAWN BY ALAN ORTHOF

Chapter 2—Article 8

By

CHARLES HAMPSON GRANT

FUNDAMENTALS OF MODEL PLANE DESIGN

How to Design Your First Power Driven Model Plane—Designing the Wings

IN THE preceding articles of this series it was shown what constitutes the basic principles of design and how they may be applied in their simplest form to a beginner's glider.

Next, the basic principles of design of a flying model will be discussed. Many embryo model builders are deterred from a career in model aeronautics simply because they do not know the proper procedure in creating the first model; like the man who wishes to journey to a distant town but does not know the road. A reference map prevents the traveler from straying; and these articles can serve as a map to show the way through the "frontiers" of this new science of model aeronautics.

Mental quagmires may be avoided by understanding the correct procedure in creating a model plane; starting from the desire to create such a craft and ending with the moment when the material expression of this desire—a superbly performing ship—brushes a cloud. Then the objective will have been achieved: victory over the problems that thwart so many beginners.

The steps to be taken to successfully complete your model plane project are as follows:

1. Decide upon the purpose your model is to fulfill.
2. The type that will serve the purpose most efficiently.
3. The size of the craft. This also is dependent upon the purpose it is to be used for.
4. Determine the aerodynamic proportions of the plane and its parts, using the rules of design to endow it with the qualities of flight that you wish it to have.
5. Lay out the complete design of the structure of your ship on paper, and then make detailed drawings of it.
6. Make a bill of materials required for the construction of the plane.
7. With the necessary materials, build the plane according to the plans.
8. Adjust the completed craft for flight; setting the wings and tail surfaces correctly in respect to position and angle.
9. Test-fly the plane and make minor adjustments until perfect flying characteristics are attained.

If this procedure is followed with your first model plane project you will not only have mastered the basic problems of the technique of model aeronautics, but you will have received a liberal education in the creation of full scale aircraft.

Of course you may not be familiar with the correct execution of each one of these steps if you have never built a model plane. However the correct procedure will be made clear by undertaking such a project as an example; discussing the problems of design building and flying as they arise.

Suppose therefore the creation of a simple rubber powered model is carried through in complete detail.

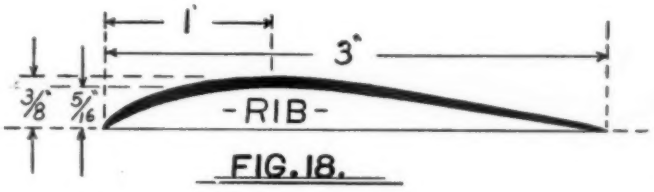


FIG. 18.

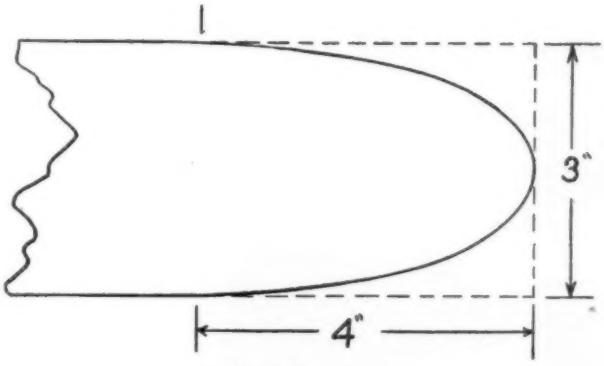


FIG. 19.

Purpose

First of all, for what purpose do you wish to use the model? Is it to be a practice or experimental model, a flying scale project, or a contest job that will "clean up" at the "Nationals"?

Inasmuch as the present purpose is to become familiar with the technique of designing, building and flying models, this plane should be essentially for practice or experiment. . . . . One that can be designed and constructed with ease in a short time. It also should be fairly sturdy, to stand up with a minimum of damage under hard use. After all, little can be learned about flying a model if a great deal of time is spent in its construction and then it "cracks up" on the first, second or third flight. It should last long enough to afford many flights that will teach its builder the art of correct flight adjustment.

Thus it can be said that the purpose is instructive.

Type

Second, a hint as to the type of model it should be, already has been given. It should be of simple design and construction, yet it should embody basic design and construction features with which the builder will became familiar in the course of this work.

The simplest type of power model that can be built is a single stick, single propeller monoplane. The simplest and strongest construction embodies no delicate framework or paper covering. A plane made completely of balsa wood is ideal. The wings, as well as the tail surfaces, may be made of sheet balsa. The aerodynamics of such a plane can be studied as readily as those more complex.

Size

Next, how large should it be? It should be large enough to fly steadily and not critical or delicate in its flight adjustments; no larger. An excessively large ship will require an unnecessary amount of structural material which is expensive.

As mentioned in the explanation of the design of the beginner's glider, the span of the wing establishes the size of the airplane. When the span is less than 12 inches, a rubber powered plane is considered small. If it is more than 24 inches, the plane is large. A practice plane should have a span which lies somewhere between these two values.

As steady flights are desired, a value of 22 inches, fairly close to the maximum limit, will give fine results.

Aerodynamic Properties

The next step is to establish the aerodynamic design features of the craft. These are to be basic and not involved so the

(Continued on page 64)

The British Fairey two-seat fighter of the latest type now being produced in quantity. (Br. Comb.)

FRONTIERS OF AVIATION

IT WAS a long time ago that we made predictions on the proposed Sikorsky S-44. Years have passed since then, times have changed and Sikorsky's ideas as to their next giant flyingboat have been altered many times. New larger engines have been designed to make a change in plans feasible, but now, with the combination of Vought and Sikorsky, the new S-44 will take a definite course to completion, so do not be surprised to see the prototype flying in trans-Atlantic service by 1941! As a matter of fact, the prototype has already been flying; the four-engined Sikorsky Navy patrol bomber that competed against Consolidated for orders.

A commercial version of this monster airplane is forthcoming from Vought-Sikorsky for service across the Atlantic. American Export Airlines is the purchaser of three of these flying boats to wage battle with Pan-American Airways for commercial supremacy. They will have a span of 124 feet, length of 80 feet and will be powered by Pratt & Whitney Twin Row engines . . . . four of them. Normally the airplane will carry 30 passengers but for trans-Atlantic service 12 will be carried, with the major portion of the payload in freight.

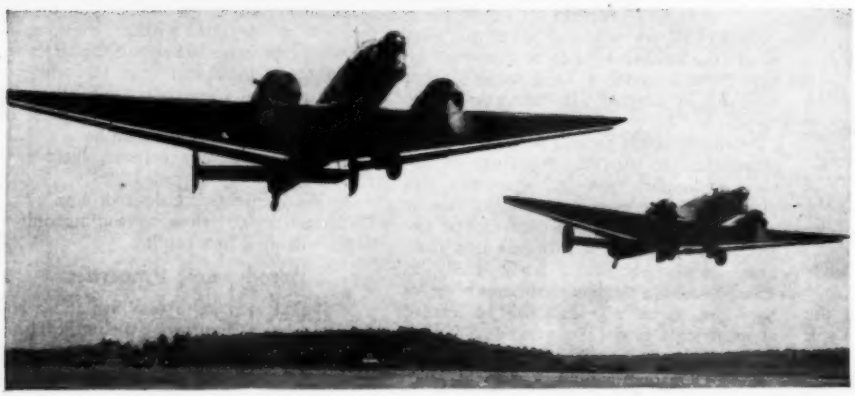
The S-44 is a full-cantilever, high-wing monoplane of exceedingly clean lines. The navy job had only one rudder which underwent some additions and alterations during tests, and like the usual large airplane being built today, the S-44 is likely to boast of one, two or three rudders consecutively. (It is amazing how the Boeing B-17 has been able to hold on to the single rudder design for so long.) They will be able to fly non-stop across the Atlantic and will also be able to cost American Export $650,000 each. American Export does not expect to make a profit with these planes, but it's a warm-up to operating larger ocean flying boats in the near future.

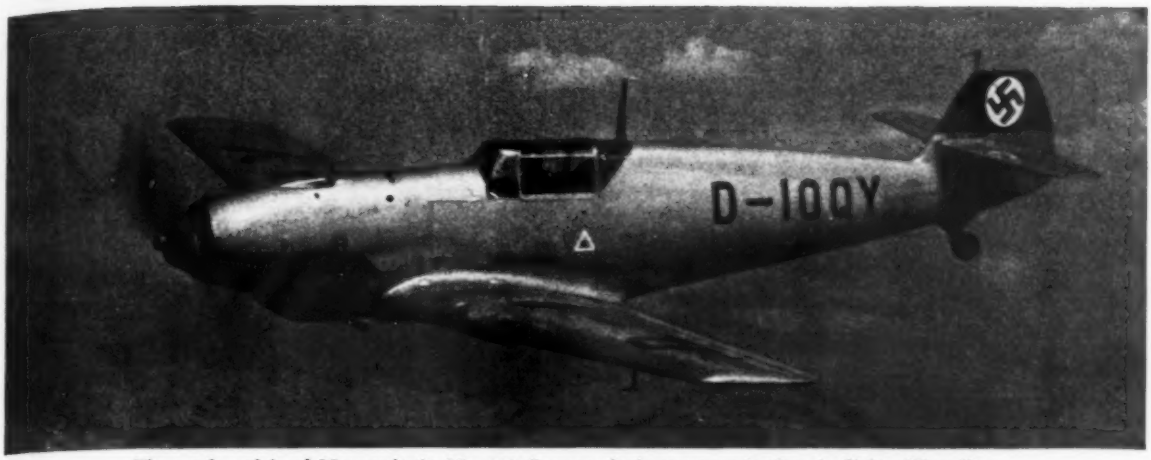
Pan-American has bought six more Boeing Clippers to make a total of twelve available for scheduled operations, and it is time that American Export Airlines began a buying splurge to stave off some of this pending stiff competition. The reason that American Export

The latest British aerial battle cruiser, with gun turrets fore and aft. (Acme)

The 208 m.p.h. Leo H. 24-6 French flying boat. (Thorell)

These Swedish bombers rate among the best in the world (Intern'l)





The much acclaimed Messerschmitt Me. 109 German single-seat pursuit plane in flight. (Thorell)

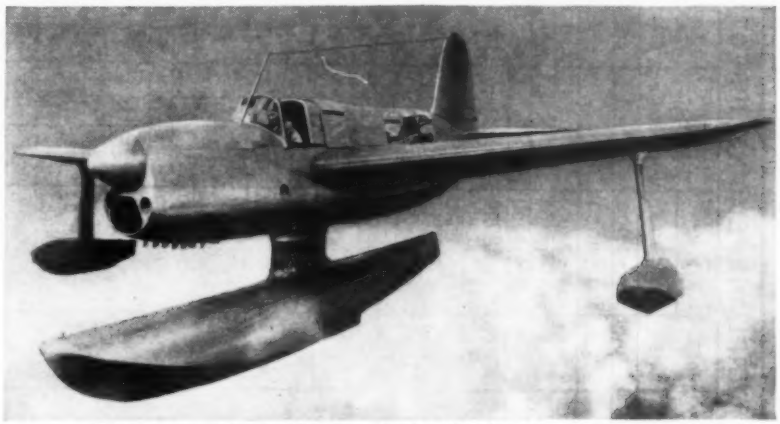
By ROBERT C. MORRISON

bought the S-44 is because the engineering was completed, a prototype test-flown and proven, and the price would therefore be lower than if buying the completely new design from Martin and Consolidated which is expected at a later date.

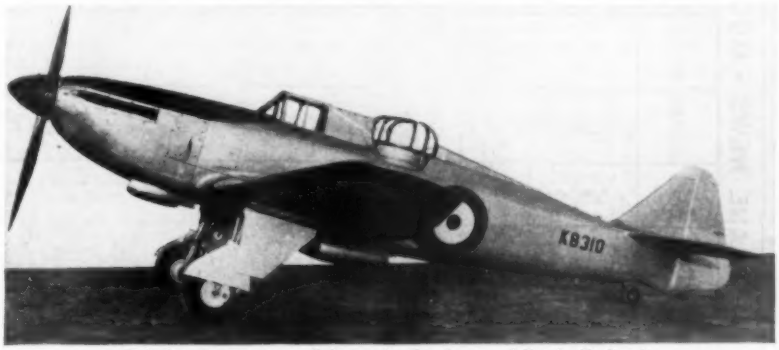
Consolidated is doing very well, however, even though Sikorsky is regaining some of its lost business in the clipper ship field. Since Consolidated has been so successful with its model 31 it has undertaken a landplane version project of this airplane and everyone is saying that American Airlines is the most likely purchaser. A twin-engined landplane transport by Consolidated is extremely interesting because of the fact that the Davis airfoil will undoubtedly be employed. They have had astounding results with it on the Model 31, which is also said to have an offspring coming up with more phenomenal performance. The new Consolidated will also be interesting in lieu of the fact that Curtiss-Wright is at last completing its sub-stratosphere Model 20, and it will take an extraordinary airplane to surpass the Curtiss-Wright's performance.

Great things are certainly to be expected from Consolidated however; they are now doubling the size of their already huge plant in San Diego, California, to produce two new four-engined U. S. Army Air Corps bomber designs. We promise you that they will be the fastest four-engined airplanes that were ever produced, hitting as high as 360 m.p.h. as top speed and 325 cruising. As a conjecture we will say that they will be high-mid-wing monoplanes with a very long, thin and narrow fuselage. Incorporating a twin rudder tail, they are expected to be rather small which gives it reason for speed, but with the high wing loadings that are used today they will carry a very sizable load of bombs, fuel and armament. They are the type of plane that England and France are sorely in need of though they have showed no signs (at this writing) of any great interest in the four-engined bomber except for the Boeing B-17. It is too big an assignment to operate twin-engined bombers by France and England

(Continued on page 58)



The fast, new Curtiss XSO3C-1 shipboard fighter of the U.S. Navy



Britain's latest 2-seat fighter, the Boulton and Paul "Defiant"

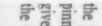
The mammoth Russian 6-engine bomber, L-760. (Sovfoto)

MODEL AIRPLANE NEWS - MODEL AIRPLANE ENGINE DIRECTORY FOR 1940

NAME	CLASS	WEIGHT IN OZ.		DISPLACEMENT	BORE	STROKE	CYCLE	PORTS	RATED	R. P. M.	FUEL PARTS		PROPELLER		MOUNT	BLOCK	TYPE OF	MINIMUM
		BARE	FLYING	IN CUBIC INS.					H.P	MIN.- MAX.	GAS WHITE	OIL SAE-70	DIA.	PITCH		TESTED	GAS FEED	WEIGHT OF PLANE IN OZ.
AJAX	C	6½		.363	¾"	13/16"	2		1/6	500 - 8000	3	1	14"	8"	BEAM-RADIAL	YES	SUCTION	29.00
ALTERNATE FIRING TWIN	C		19	.326	5/8"	17/32"	2	4	1/5	500 - 8000	4	1	14"	8"	BEAM	YES	SUCTION	26.10
AVION MERCURY	OPEN	21¾	36	1.53	1¼"	1¼"	2		¾	500 - 3800+	4	1	20"	10"	BEAM	YES	SUCTION	12.23
ATOM	A	2	3½	.097	½"	½"	2	9	1/8 - 1/10	250 - 17500	3	1	10"-12"	6"-7"	BEAM	YES	SUCTION	7.76
BANTAM	A	2¾	7.02	.165	19/32"	19/32"	2	3	1/7	500 - 10000	3	1	10"-12"	6"-7"	BEAM	YES	SUCTION	13.20
BRAT	A	3⅓	8	.155	9/16"	5/8"	2	4	1/7	500 - 8000	3	1	9"	6½"	BEAM	YES	SUCTION	12.40
BROWN-B	C	6½	21½	.6	7/8"	1"	2	4	1/5	500 - 7000	3	1	14"	8½"	BEAM	YES	SUCTION	48.00
BROWN-C	C	6½	21½	.6	7/8"	1"	2	4	1/5	500 - 7000	3	1	14"	8½"	BEAM	YES	SUCTION	48.00
BROWN-D	C	6½	21½	.6	7/8"	1"	2	4	1/5	500 - 7000	3	1	14"	8½"	BEAM	NO	SUCTION	48.00
BELMONT	C	9	22	.564	7/8"	15/16"	2	4	1/4 +	TO- 8600	4	1	14"	8½"	BEAM	NO	SUCTION	45.10
BUNCH "MIDGET"	C	6½	21½	.45	7/8"	¾"	2	4	1/5 - 1/4	TO- 7500	3	1	12"	6½"	BEAM	NO	SUCTION	36.00
CONDOR	A	3	7⅝	.18	5/8"	19/32"	2	4	1/8	500 - 15000	5	1	11"	8½"	BEAM	YES	SUCTION	14.40
CYCLONE	C	6½	20	.363	12/16"	13/16"	2	3 PORT ROTARY VALVE	1/5	500 - 5500	3	1	12¾"	8"	BEAM	YES	GRAVITY	29.00
DENNYMITE	C	10	21	.563	9/10"	9/10"	2	4	¼	500- 6500+	3	1	13"-14"	7½"- 8"	BEAM	YES	SUCTION	45.00
ELF	A	4	8	.140	9/16"	9/16"	2	4	1/32	TO- 4500	8	1 SAE 60	12"	6½"	BEAM	YES	SUCTION	11.20
FORSTER	C	14	25	.997	1 1/16"	1⅛"	2	4	⅓	UP TO 5000	3 4 10	1 1 1	16" 18" 20"	10"-12½"	BEAM or RADIAL	YES	SUCTION	79.80
G.H.Q.	C	10	18-20	.518	15/16"	¾"	2	4	1/5	300 - 7000	5	1	14"	8"	BEAM	YES	SUCTION	41.45
GWIN-AERO	C	6½	21½	.45	7/8"	¾"	2	4	1/5 - 1/4	TO- 7500	3	1	12"	6½"	BEAM	NO	SUCTION	36.00
GNAT	A	4½	8	.156	9/16"	5/8"	2	4	1/10	TO- 7500	3	1	10"-12"	6"- 7"	BEAM	YES	SUCTION	12.48
HUSKY "J.V."	A	2¾	6	.192	5/8"	5/8"	2	4	1/8	250 - 8000	3	1	11"	8½"	BEAM	YES	SUCTION	15.35
HURLEMAN	C	6.7	21	.460	7/8"	13/16"	2	4	1/5	500 - 8000	4	1	14"	8½"	BEAM	YES	SUCTION	35.80
IMP G-9	C	9	14	.565	7/8"	15/16"	2	4	1/5 +	300 - 7000	3	1	13"	7½"	BEAM	YES	SUCTION	45.20
JAMES	C	8	22	.647	15/16"	15/16"	2	4	¼	TO- 7000	4	1	13"	7½"	BEAM or RADIAL	YES	SUCTION	51.80
KAYDET	A	4	8	.163	5/8"	17/32"	2	4	1/7	500 - 8000	¾	1	10"-12"	6"- 7"	BEAM	YES	SUCTION	13.33
LITTLE DYNAMITE	C	6½	21½	.375	.781"	.781"	2	ROTARY VALVE	1/5	TO- 6000	3	1	14"	8½"	BEAM	YES	OPTIONAL	30.00
M & M	B	4½	11	.292	23/32"	23/32"	2	4	1/7	500 - 8000	3	1	11½"	8½"	BEAM	YES	SUCTION	23.39
OHLSSON "23"	B	4	9	.213	5/8"	11/16"	2	4	1/7	500 - 10000	2	1	10"-12"	6"- 7"	BEAM-RADIAL	YES	SUCTION	16.88
GOLD SEAL	C	8	22	.564	7/8"	15/16"	2	4	1/5	500 - 10000	3	1	14"	8½"	BEAM-RADIAL	YES	SUCTION	45.10
O.K. TWIN	OPEN	18	28	1.21	.900"	.950"	2		½	800- 10000	4	1	18"	10"-12½"	RADIAL	YES	SUCTION	96.80
O.K. STANDARD	C	7¾	21	.616	.900"	31/32"	2	4	1/5 +	1200- 12000	3	1	14"-15"	8½"	BEAM-RADIAL	YES	SUCTION	49.30
O.K. SPECIAL	C	7¾	21	.616	.900"	31/32"	2	4	1/5 +	1200- 12000	3	1	14"-15"	8½"	BEAM-RADIAL	YES	SUCTION	49.30
PEE-WEE	A	5	9	.140	9/16"	9/16"	2	4	1/10	500 - 10000	¾	1	10"	6"	BEAM	YES	SUCTION	11.20
PHANTOM "G"	A	3½	8	.276	¾"	5/8"	2	2	1/7	TO- 6500	3	1	11"	8½"	BEAM	YES	GRAVITY	22.08
REBEL	A	4½	8	.230	5/8"	¾"	2	4	1/7	350 - 5000	3	1	10"- 11"	6"- 7"	BEAM	YES	SUCTION	18.4
SYNCRO "ACE"	C	10	21	.564	7/8"	15/16"	2	4	1/5 - 1/4	TO- 10000	4	1	13"-14"	7½"-8½"	BEAM-RADIAL	YES	SUCTION	45.10
SYNCRO "BEE"	A	3¾	8	.122	½"	5/8"	2	4	1/8	1000 - 8000	4	1 SAE 60	9"-10"	6½"	BEAM-RADIAL	YES	SUCTION	97.60
TORPEDO	C	4¾	9	.304	¾"	11/16"	2	2 PORT ROTARY VALVE	1/5	TO-14000	2½	1	13"-14"	7"-8"	BEAM-RADIAL	YES	SUCTION	24.32
TROJAN	A	5	9	.232	11/16"	5/8"	2	4	1/7	TO- 6500	4	1	10"	6"	BEAM	YES	SUCTION	18.56

JESSE DAVIDSON

MANUFACTURERS' FIGURES FOR BORE AND STROKE HAVE BEEN USED TO CALCULATE THE PISTON DISPLACEMENT BY MEANS OF THE FORMULA Cu=(0.7854) B².S. N: IN WHICH B=BORE; S=STROKE AND N=THE NUMBER OF CYLINDERS



The K.G. LIVES AGAIN

How to Create a Modern Streamline Version of the Record-Breaking K. G. Combining Super Soaring Qualities and a Skyrocket Climb—Building the Fuselage

It has a soaring type wing and high power loading

By HENRY STRUCK

PART TWO

THE ENGINES WHICH MAY BE USED UNDER THE 1940 RULES ARE LISTED AT THE END OF THIS ARTICLE

LAST month after we discussed gas model flying and the circumstances under which this model came into being, we described the construction of the wing and tail assembly. If you wish to begin this stable, high-performance model now we suggest you get a copy of last month's M. A. N. and catch up with the job. For those who have completed the wing and tail, the next step is to build the fuselage.

Fuselage Construction

The fuselage is planked. This seems such a tedious and difficult task that we can almost feel the vibration of some of you shuddering. But with a proper system quite the reverse is true, while the advantages of a planked body are obvious. To those who remain unconvinced two other courses are open. One is to use sheet balsa, which has proven to us to be as difficult as planking without producing as smooth a job. The other is to substitute stringers. If about fifteen stringers of 1/8" x 1/4" hard balsa are spaced around the bulkheads a very nice fuselage can be built. After bulkhead F-9 six of the stringers may be stopped to avoid congestion at the rear. Sheet balsa should be fitted between the stringers from F-1 to F-3 and the fuselage covered with silk.

But every modeller should turn out at least one "masterpiece," and we are sure this ship will prove well worth the effort.

Lay out the inner frame plan in full size. The longerons are perfectly straight to simplify the task of turning out a true frame on which to assemble. Construct the bottom, or plan view, first and build the peak of the triangle on it while still pinned to the work bench. The side view gives the height of the top longeron above the bottom and not the true length of the struts. These must be fitted in place. (See step I, fuselage assembly detail, Plate V.)

It is composed of structural units that may be assembled or taken apart quickly

Cut the bulkheads, given full size on Plate VI, from 1/8" sheet and slip them on the frame. Cement in place the 3/16" sheet pylon formers D-1 and 2, shown full size on Plate V. Lay a floor of 1/8" sheet and fill the space between F-3 and 4 with 1/16" sheet walls to form a rigid box. The top of the pylon E consists of a number of 3/16" sheet sections. The outline of these coincides with that of the wing base, which was given last month on Plate IV. Form a pair of "U" shaped hooks of .040 piano wire and anchor them to the pylon formers with several coats of cement. Stiffeners of 3/16" square and a diagonal in the front pylon section are fitted to prevent the taut covering from pulling down the edges.

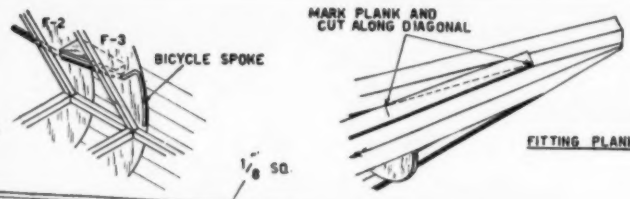
Pin a number of planks in place and check the bulkheads for high spots that may cause bumps in the finished job. When any offending areas have been sanded down, cement the five main planks in place. (See step II, fuselage assembly detail, Plate V.)

(Continued on page 54)

It embodies the same stable arrangement as its big brother K.G.

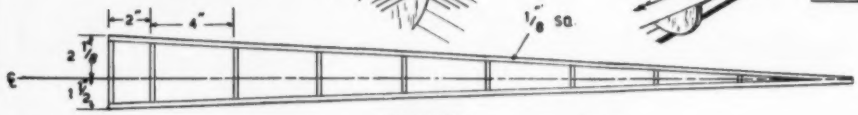
A fast take off for a long flight

PLATE V



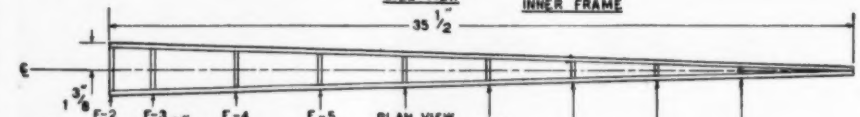
MOTOR MOUNT RETAINER DETAIL

FITTING PLANKS

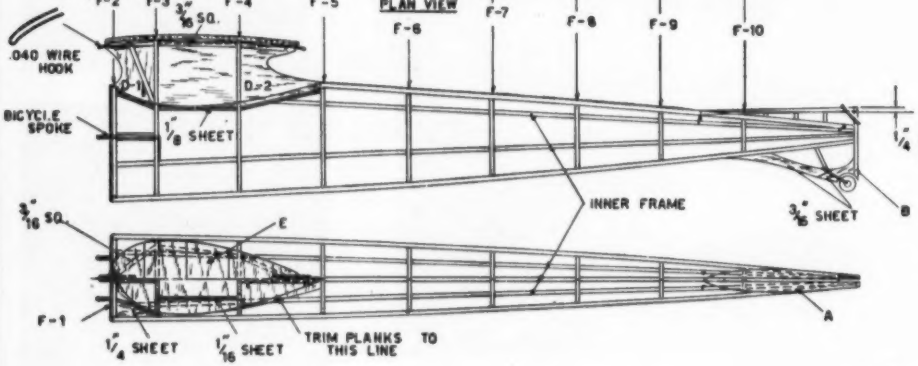


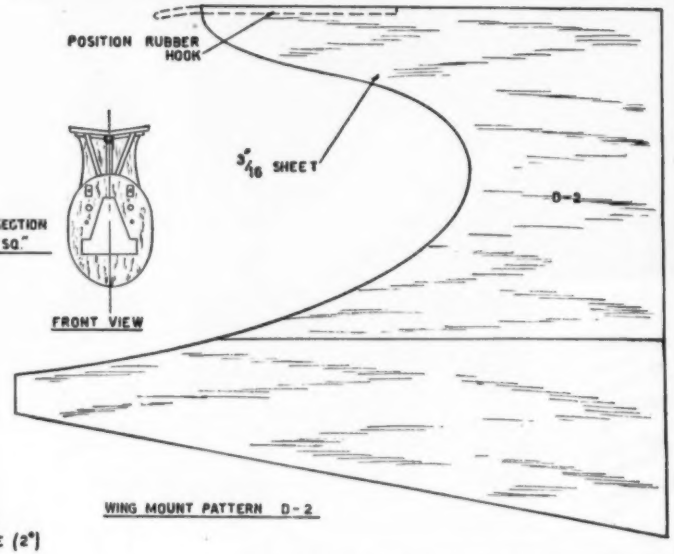
SIDE VIEW

INNER FRAME



PLAN VIEW



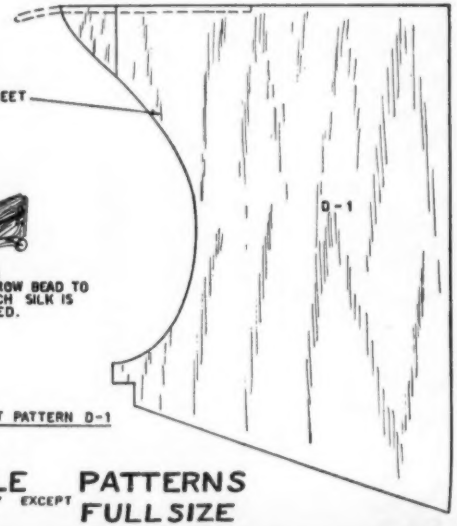


CROSS SECTION 23 SQ."

FRONT VIEW

WING MOUNT PATTERN D-2

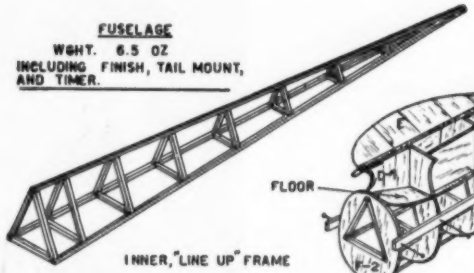
PLANK FUSELAGE WITH 1/8"x3/8" STRIPS



WING MOUNT PATTERN D-1

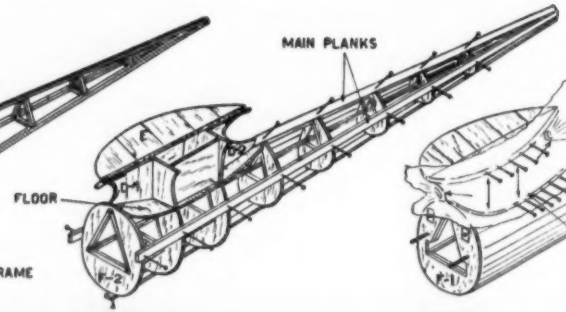
FUSELAGE

WGHT. 6.5 OZ
INCLUDING FINISH, TAIL MOUNT, AND TIMER.



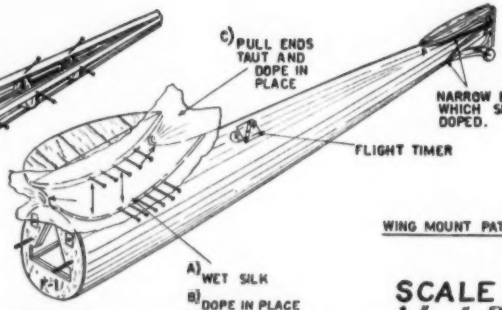
INNER, "LINE UP" FRAME

STEP I



STEP II

FUSELAGE ASSEMBLY DETAILS



STEP III

SCALE 1/8" = 1" EXCEPT PATTERNS FULL SIZE

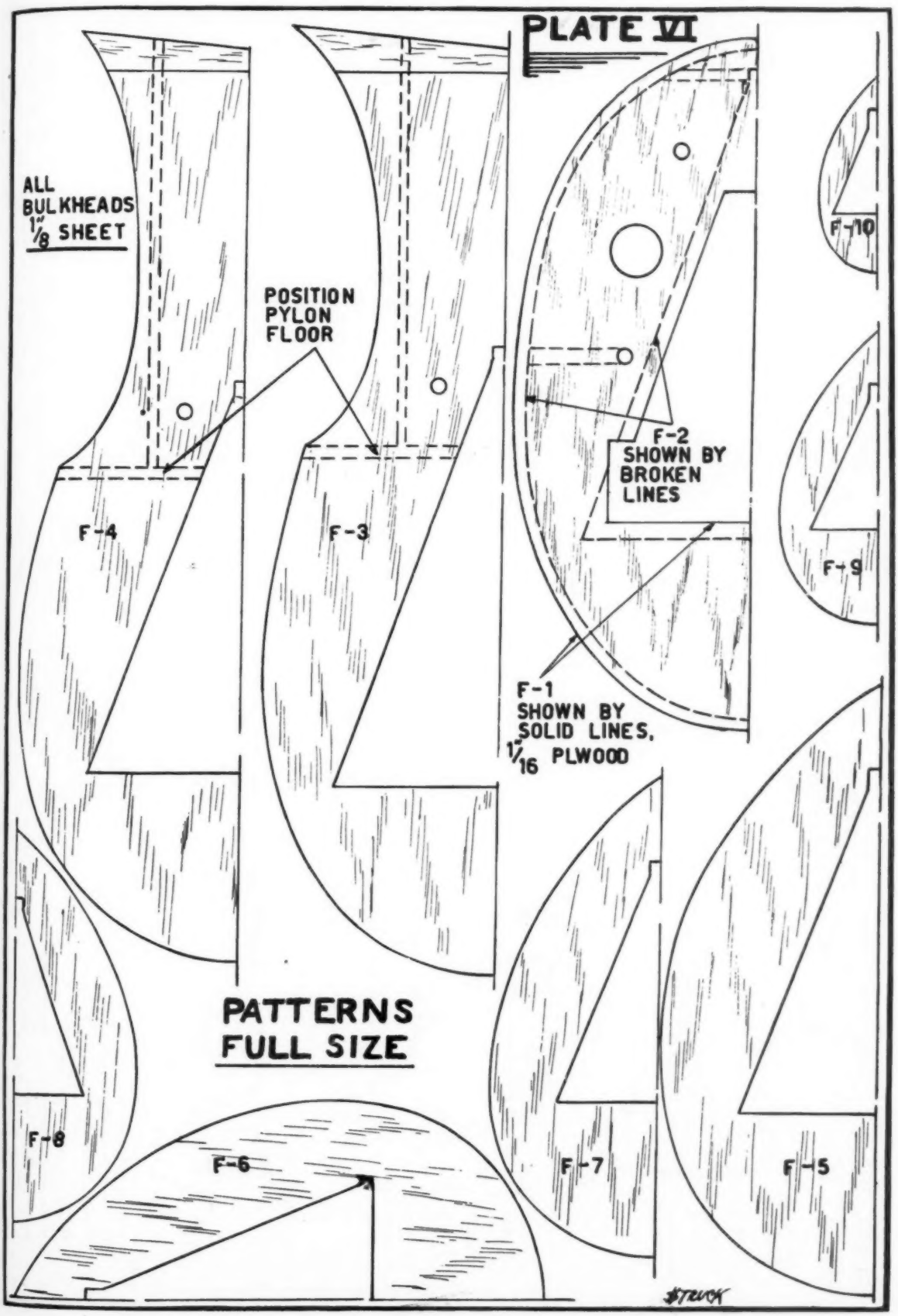
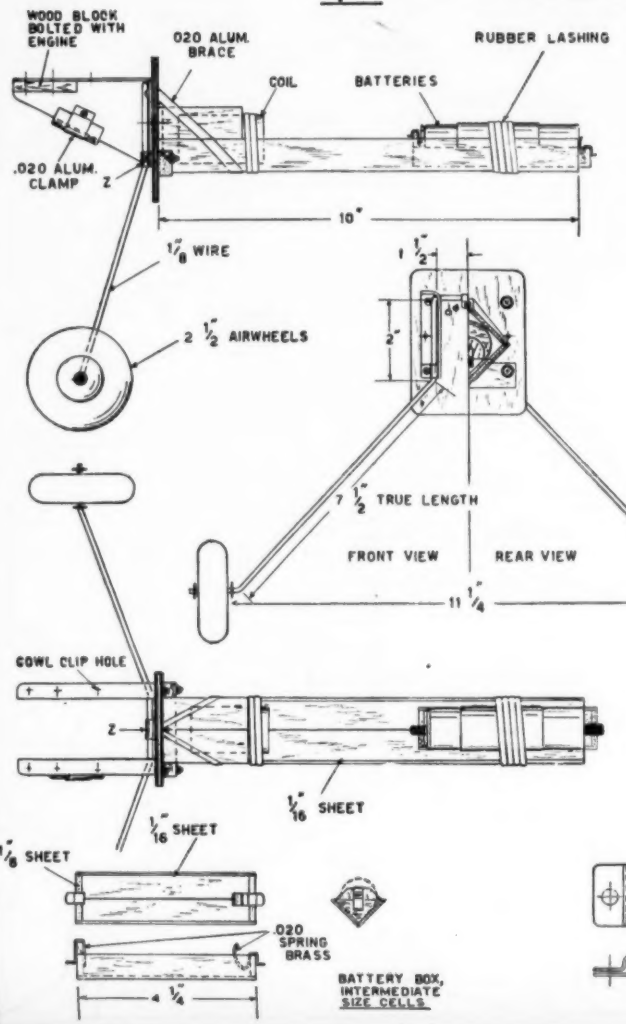
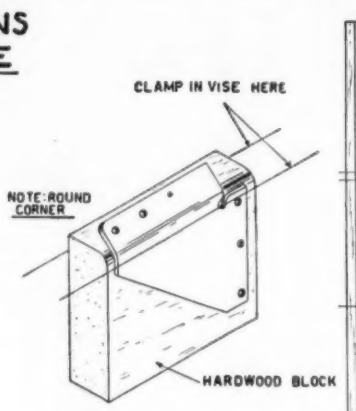


PLATE VI
ALL BULKHEADS 1/8 SHEET
POSITION PYLON FLOOR
F-4
F-3
F-2 SHOWN BY BROKEN LINES
F-1 SHOWN BY SOLID LINES. 1/16 PLWOOD
F-10
F-9
PATTERNS FULL SIZE
F-8
F-6
F-7
F-5

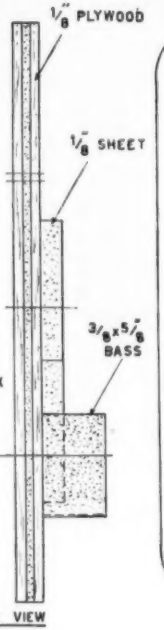
PLATE VII

SCALE 1"=1" EXCEPT PATTERNS FULL SIZE

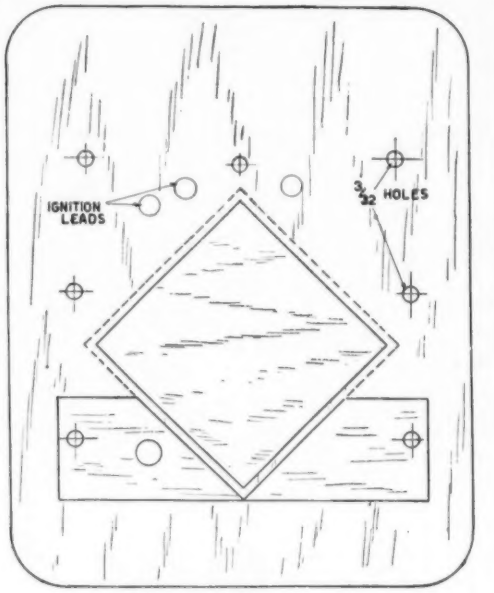




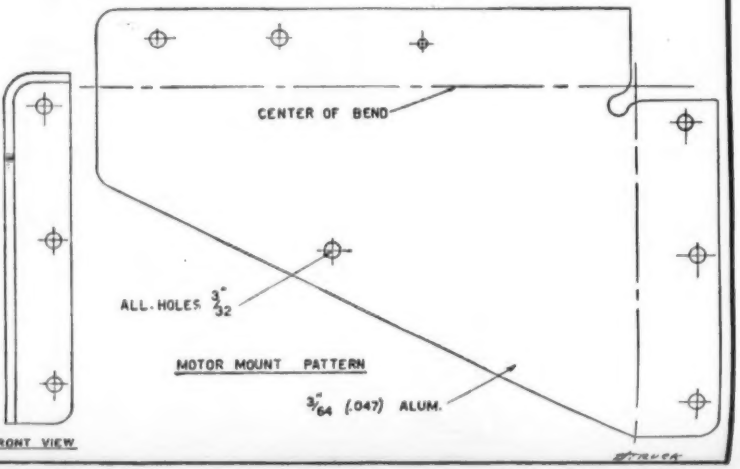
MOTOR MOUNT BENDING



SIDE VIEW



MOTOR BULKHEAD



MOTOR MOUNT PATTERN

FRONT VIEW

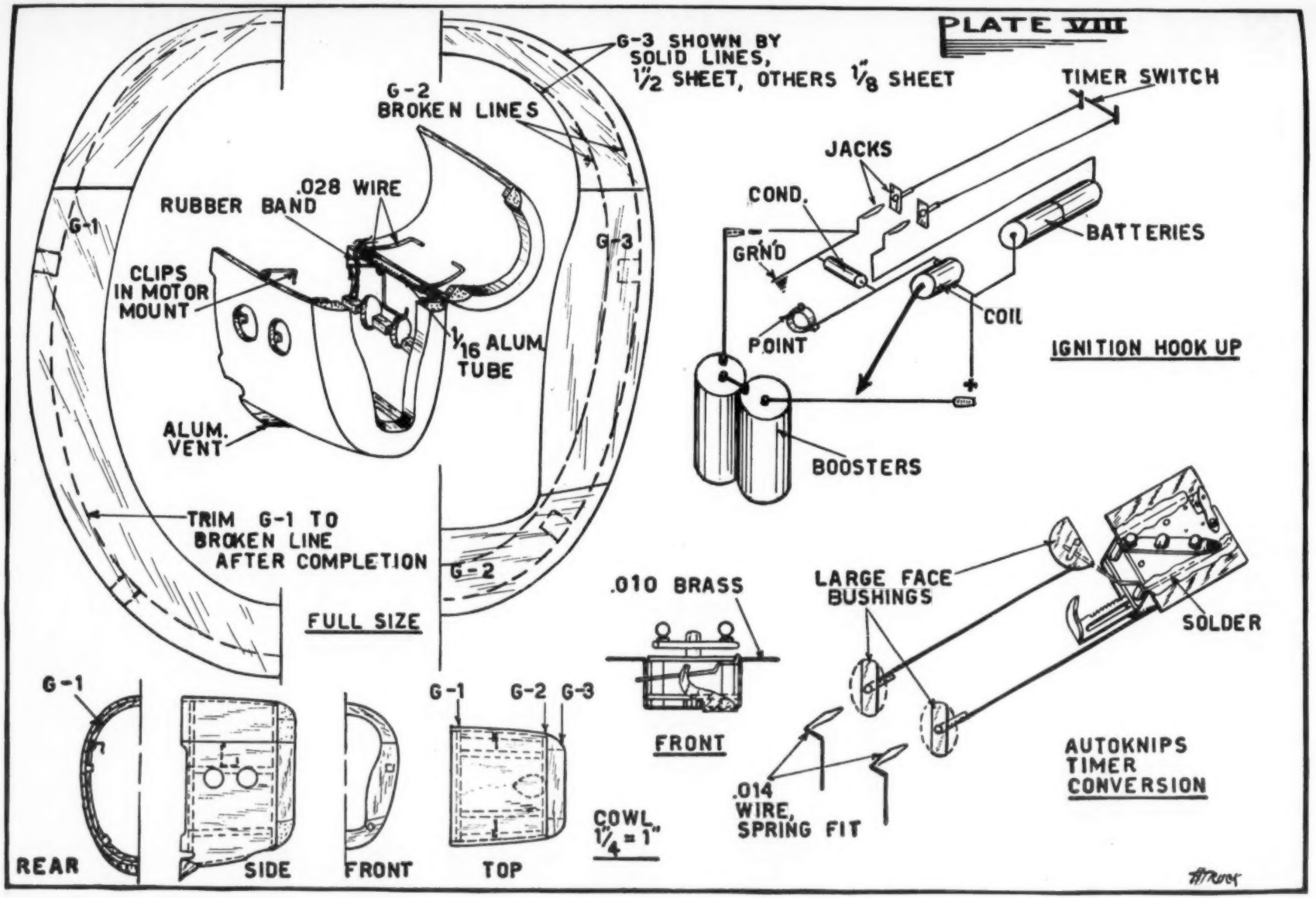


PLATE VIII
G-3 SHOWN BY SOLID LINES, 1/2 SHEET, OTHERS 1/8 SHEET
G-2 BROKEN LINES
.028 WIRE
RUBBER BAND
G-1
G-3
CLIPS IN MOTOR MOUNT
1/16 ALUM TUBE
ALUM. VENT
TRIM G-1 TO BROKEN LINE AFTER COMPLETION
G-2
FULL SIZE
TIMER SWITCH
JACKS
COND.
GRND
BATTERIES
COIL
POINT
IGNITION HOOK UP
BOOSTERS
.010 BRASS
FRONT
LARGE FACE BUSHINGS
SOLDER
.014 WIRE, SPRING FIT
AUTOKNIPS TIMER CONVERSION
G-1
G-1 G-2 G-3
REAR
SIDE
FRONT
TOP
COWL 1/4 = 1"

Designing Gas Models For Performance

The First of a Series of Articles That Provides You With Simple and Accurate Methods of Determining the Performance Characteristics of Planes

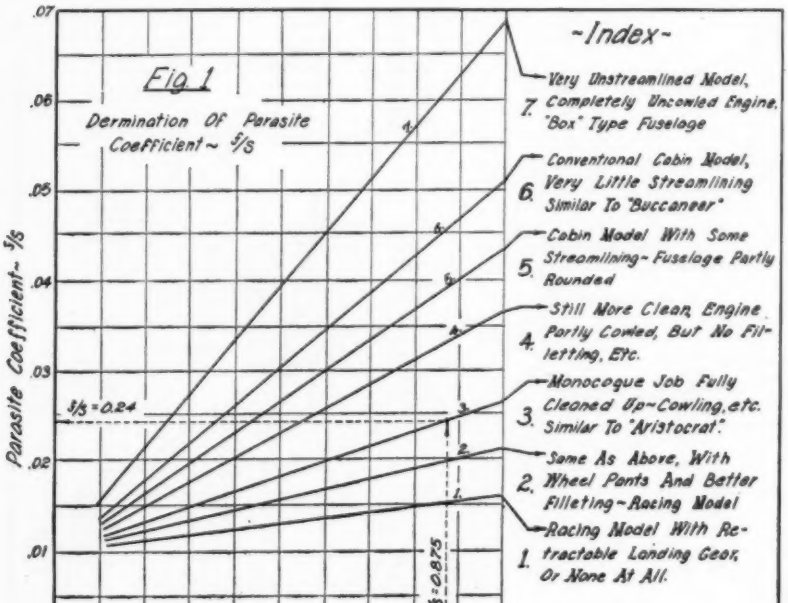
"SCIENTIFIC design" has long been a very much abused term in this hobby of model building. There are some who have claimed, rightly enough, that their designs were worked out on a purely scientific basis, but it is the contention of this writer that *all* design has some science as its basis.

Let us suppose that a young chap has a gasoline engine. He wishes to build a model "around" this engine and hopes to attain thereby a certain performance. Perhaps he would be satisfied to see his design stagger through the air in a poor simulation of flying, and very probably, that is exactly what the model would do. Nevertheless, this embryonic aeronautical engineer has decided what the performance of his model would be, and has applied all his knowledge to the culmination of the design. Should the design fail to live up to the expected performance, no doubt our young friend will make some changes in order to alter the model's performance in what he hopes will be the right direction.

The above procedure differs from so-called "scientific design" in only one respect: In the latter process it is not necessary to build the model after the first approximation. Instead, the model builder checks his design not by flying, but by computing the performance of the model on paper. Thus, he can easily ascertain the worth of his design and make any necessary changes to alter the performance. It is now becoming almost obligatory to follow this procedure in order to win out at contest, for the latest rules have placed models on a more even level than ever before.

It has long been an erroneous assumption that the computation of performance can be accomplished only by those with a thorough knowledge of engineering. Actually, any person who can multiply and divide can compute performance in a short time. In this series of articles, information will be given enabling any model builder to find out what the performance of his model SHOULD BE. The words "should be" were used in the last statement because all the performance computed will represent a maximum value. In other words, when you determine the rate of climb of your model, it will represent the MAXIMUM rate of climb of the model, obtainable only by careful adjustment. In a later article, the adjustment of the gas model will be discussed.

The method of obtaining performance given here is known as the "Oswald" method of performance calculation. Actually, there is practically no calculation, with all the results being read off charts. After the first time, anyone can get the COMPLETE performance of his model in much less than an hour, which includes maximum speed, speed for maximum rate of climb, maximum rate of climb, minimum sinking speed, minimum gliding angle and the speeds for the two preceding conditions.



To make the process entirely clear, the performance of a sample model will be obtained, using the charts and other information given here. To show how easily this may be done, the following outline of procedure in obtaining performance is given.

1. Determine the specifications of your model, including weight, wing area, wing span, aspect ratio, wing loading, motor used, and airfoil section used.

2. Determine parasite factor, f, from fig. 1.

3. Calculate span loading, l_s, parasite loading, l_p, and power loading, l_e.

Part I

By LEO WEISS

4. Obtain general loading factor from fig. 3.

5. Obtain complete performance of airplane from the charts, using loading factor, L.

Notice in the above five-step outline, that in only one step, the third, is calculation required. It will be seen later that the calculation of l_p, l_s, and l_t is little more than a ten-minute job.

Now we can go through our procedure, following the outline exactly. The specifications of our example model are given below.

Weight .....7 pounds
Wing Area.....8 square feet
Wing Span.....9 feet
Aspect ratio.....10 (approx.)
Wing Loading....0.875 lbs. per sq. foot
Motor .....Brown or equivalent
Airfoil M-6

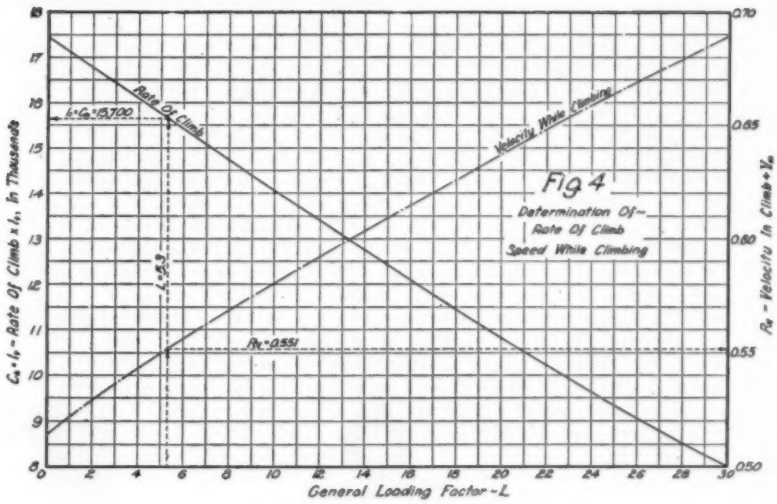
In addition to the above information, we must know how "clean" the model is, whether the motor is cowled or not, if there are many struts exposed, if the fuselage is round or square, etc. These things must not be known separately, but it is good to get a general idea of how clean the model is, in comparison to some well-known designs.

In step No. 2 we are asked to find the parasite factor, f. Looking at fig. 1, we see f/S plotted against wing loading for contemporary model designs. f is our required factor, and S is the wing area. Knowing that the sample model is well streamlined, with a cowling but exposed wheels (similar to the "Aristocrat" in February '37 MODEL AIRPLANE NEWS, it would seem that curve No. 3 on fig. 1 would be the best approximation. The dotted line shows how the wing loading of 0.875 is spotted off, carried up until it intersects curve No. 3, and then carried over horizontally so that the value of f/S may be read off. Reading this, it is found to be 0.24. Therefore, $f = 0.24 \times S$. Since S is equal to 8 square feet, $f = 0.24 \times 8 = 0.208$.

There are a few more words we can say about obtaining f. Suppose you have a conventional square fuselage, partly enclosed motor but no cowling; or in other words, a model similar to the well known "Buccaneer" or "Miss America," and you wished to find f. Obviously, curve No. 6 would be the most appropriate. However, if you used a wing section that was exceptionally thick, with deep undercamber, it would be advisable to go up to curve No. 7. This is true for all cases, when an abnormally thick section (over 12% of the chord, maximum thickness) is used, and it would be safer and more accurate to go up to the next curve. This will be done only in exceptional cases.

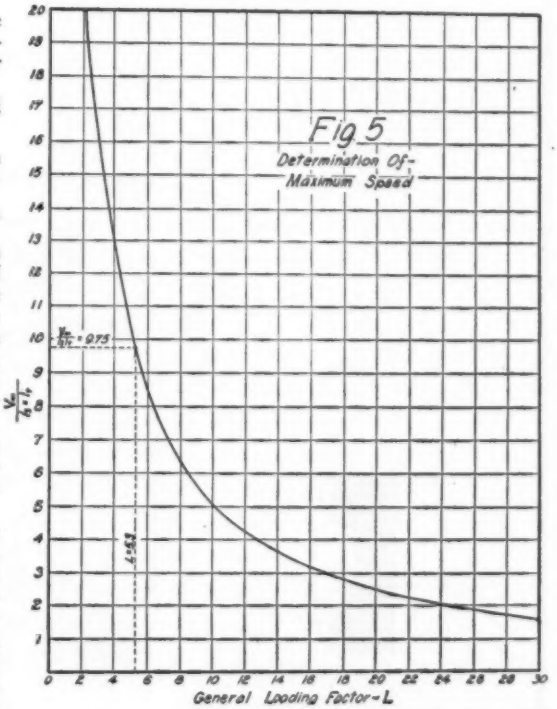
Step 3 is the determination of the span loading l_s, parasite loading l_p, and power loading, l_t.

Parasite loading is given by the equation, $l_p = \frac{W}{f}$, where W is the weight in pounds, and f is the parasite factor just determined. Therefore, for our model, $l_p = \frac{7}{0.208} = 33.7$.



Span loading is given by the equation, $l_s = \frac{W}{e \times b^2}$. In this equation, W is again the weight in pounds, b is the span of the model in feet, (notice that it is squared in the equation) and e is an efficiency factor which, for monoplanes with an aspect ratio of six, may be taken as 0.88. For increases of one unit in aspect ratio, e should be decreased by two percent.

The aspect ratio of our sample model is ten, which is four units more than six. This means that e should be decreased by eight percent, or should be 0.80 instead of 0.88. Now we can get l_s from the equation, $l_s = \frac{W}{e \times b^2} = \frac{7}{0.80 \times (9)^2} = \frac{7}{0.80 \times 81} = 0.108$.



Power loading, l_t, is given by the equation, $l_t = \frac{W}{(bhp) \times n}$, where W is still the weight of the model, bhp is the rated horsepower of the motor, obtained for most engines from fig. 2, and n is the efficiency of the propeller, which may be assumed equal to 0.78 for practically all gas models. In a later article, it will be shown how this value of n will vary for certain models, but it is sufficient for now to assume n constant at 0.78. The power loading, l_t, may be calculated from $l_t = \frac{W}{(bhp) \times n} = \frac{7}{0.2 \times 0.78} = 44.8$. Notice that bhp was obtained from fig. 3, where the power of the Brown was

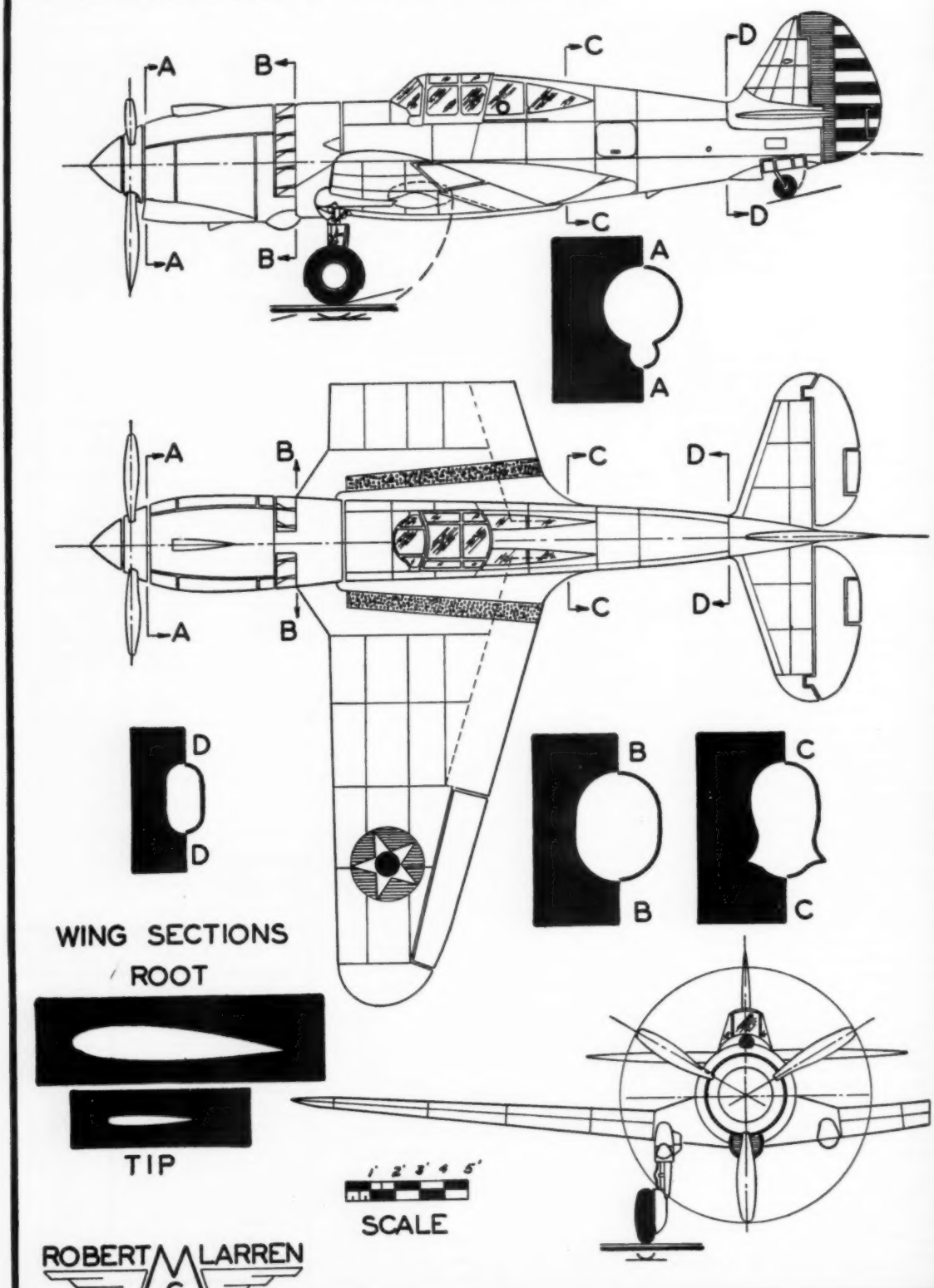
(Continued on page 48)

Make of Engine	Rated h.p. At 4,000 r.p.m.
Forster Brothers	0.40
James Motor	0.215
Brown "Junior"	0.20
Ohlsson	0.19
Syncro Ace	0.19
Bunch	0.16
Baby Cyclone	0.14
Gwin Aero	0.14
Atwood "Phantom"	0.092
Husky	0.064
Chunn	0.055
M & M Engine	0.052
Brat	0.030

— FIG. 2 —

CURTISS XP-42

P&W AIR COOLED RADIAL ENGINE



Hidden Power On Fighting Wings

THE PLANE ON THE COVER

BY ROBERT McLARREN

A RECENT survey was made to determine, if possible, the exact part that aircraft engine development has played in the development of today's high speed military and commercial aircraft. After several months of laborious research and compilation of data, a final graph was drawn up and the startling results published. We say "startling" because it was definitely proved that sixty-two per-cent of today's increase in speed and performance over yesterday's aircraft could be directly attributed to aircraft engine development.

In the thrill and excitement attending the debut of a new type airplane great attention is called to its clean lines and finesse of design, and little attention paid to its new-type engine. This month we're going to talk about a new-type fighting plane, possibly the fastest in the world today. But we're going to tell you mainly about its engine, for the Pratt & Whitney Double Wasp engine mounted in the Curtiss XP-42 pursuit plane is really our Engine on the Cover this month!

The controversy over "in-line vs. radial" has raged for years, since the early 'teens as a matter of fact. And on every count but one, the air-cooled radial engine had it over the liquid-cooled in-line type. That one count was streamlining, or more correctly, less parasite drag. Beginning in the middle twenties the United States famed aeronautical research group known as the National Advisory Committee for Aeronautics with headquarters at Langley Field, Virginia, began battling the problem. The first definite forward step they achieved was the introduction of the famed N.A.C.A. ring-cowl, the streamlined sheath mounted around the circumference of the radial engine. Years of research and development followed and the ring-cowl was improved upon by increasing its width, beefing up its entering edge and adding cowl flaps for controlled cooling.

And now with the Curtiss XP-42 pursuit plane comes the victory aviation has been patiently awaiting for 15 years; an air-cooled radial engine with LESS parasite drag than an equivalent in-line liquid-cooled type.

Work on this new type engine began nearly three years ago when representatives of the Pratt & Whitney Division of United Aircraft and the United States Navy got together to discuss the problem. Naval aviation neither uses nor approves liquid-cooled engines. Therefore, they wanted an air-cooled radial engine with at least the same drag of an equivalent liquid-cooled model.

The Curtiss XP-42 in action

Pratt & Whitney engineers set to work to solve the following problem:

Firstly, the engine must be powerful, the most powerful in the world; secondly, it must be compact to lend itself to narrow cowling; and thirdly, it must be easily

(Continued on page 68)

HURRAY FOR US!!! SAYS THE INSTRUCTOR

HALF a decade of model aeronautical progress . . . how time glides on! Yes, the prof has made an exhaustive survey of worldwide aeromodeling activities, and herein passes along his random observations to his students—both of them (Hi, Dad; Hi, Mom).

At the outset he hastens to explain that anyone can conduct a similar search through the model aviation record . . . at no cost and in very little time. What! No questionnaires, no doorbell ringing, no nation-wide poll required?

No, students, just a copy of each issue of MODEL AIRPLANE NEWS which has been printed during the past 10 years (if you're fortunate enough to possess a set) . . . there's your best method of determining changes and advancements over that period—for "M.A.N.," you know, has celebrated its 10th anniversary, and although just entering its "teens," it has been wearing long pants for many years.

Ten years ago flying models which performed creditably were few, and the fortunate fellow who could get a 60-second flight found himself on the front page of all the local papers. Streamlining was practically unheard of . . . (1) since few modelers realized its worth and (2) modeling was following the trend of the full-scale craft which were rather "box-carish" themselves.

Came the passing of years, the coming of such researchers to the fore as Charles H. Grant and his contemporary associates, and soon their designs and theories were being followed by a large number of model aeronauts throughout the world.

Using the blackboard to develop his theme, the Instructor lists the various steps in modelplane progress as follows:

* * *

First, there were models which wouldn't fly—followed by models which wouldn't fly well.

* * *

Then better-proportioned and better-powered rubber models appeared.

Came gas engines and gas models—but the majority of early gasoleers couldn't operate the former, or adjust the latter.

* * *

Came the revolution—streamlining!

* * *

Then a better understanding of what makes a motor tick and a model climb.

* * *

About this time, indoor models took the count of 99 and 44/100's.

* * *

Outdoor rubber craft began following the new and heavier N.A.A. specifications, and consequently, were better designed, more solidly constructed, faster—and much more fun to watch and fly.

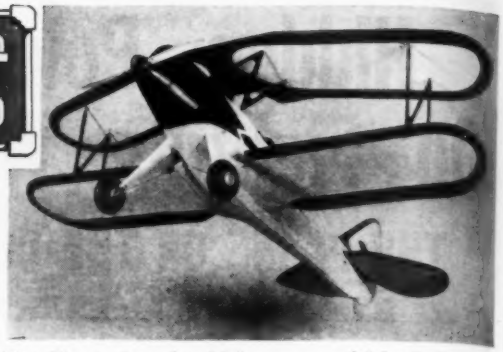
* * *

Comes now—with gas models really being "engineered" by designer-flyers; outdoor rubber craft reaching new heights in design and performance; and a revival of interest evidenced in indoor categories.

(Continued on page 64)

GAS LINES

Gas Model News From All Parts of the World



Pict. No. 1. A perfect biplane gas model by L. R. Lloyd

NOW that the rule adopted for gas models requires that the total weight of the model be proportional to the cubic inch piston displacement of the engine, it becomes imperative that some reliable record of piston displacement of various engines be readily available; also that an official list of minimum required weights allowable for each engine be made convenient for reference. Such a list of displacements and weights must be official; that is, it must be passed by the N.A.A. and released as authentic N.A.A. figures.

Up to this time no such list has existed. However we take pleasure in presenting a list of displacements and minimum weights of planes, as well as a complete table of engine characteristics, on page 14.

In calculating the piston displacement for each engine, the values of the bore and stroke that have been used are those given by the manufacturers. The piston displacement values have been calculated by the formula: $(0.7854) \times B^2 \times S \times N$=cu. in. pis. displ. This formula is the simplest and most accurate that may be used. The manufacturers' figures for piston displacement haven't been accepted in this case. In fact, in calculating the values of the displacements, several discrepancies were found to exist between the manufacturers' figures and the accurate amounts. The table shows the correct values.

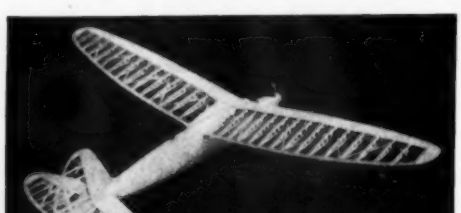
One of the objections that had been raised to the 1940 gas model rules was that at contests it would be a complicated matter to determine the eligibility of a plane, in respect to its weight and piston displacement. *This is not a fact.* All that is necessary is that the contest official have before him a complete list of engines that may be used at the contest. After each engine should appear the correct piston displacement in cubic inches, followed by the minimum allowable weight for any plane using such an engine. It then becomes a simple matter to determine whether or not any plane is eligible.

First, the contest official notes the type of engine used. Second, the weight of the plane is determined. (It has been necessary to find out the weight under past rules.) Third, the official refers to the list and notes if the weight of the plane is equal to, or above, the minimum allowed for the particular engine used. If it is below the allowable weight, the contestant must add sufficient weight to his plane to bring it up to the allowable minimum. If the weight of the plane is above the minimum shown on the chart, it is eligible without further weight addition. Thus such a list, as presented in this issue, makes it a simple matter for officials to check each plane at a contest. We suggest that model builders keep this issue available for ready reference, or that they clip out the page upon which the chart appears so that it may be ready for use at any time.

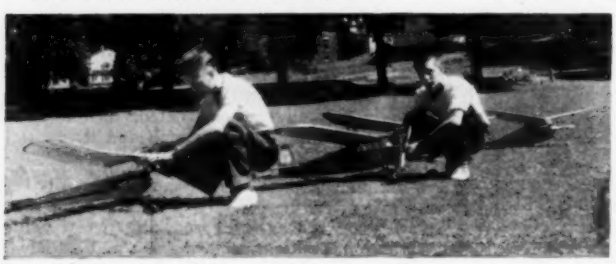
Gas models are serving new purposes every day. L. Ray Lloyd of 48 Federal Avenue, Logan, Utah, has found it convenient to build a gas model, in all details, as a mock-up of a sportplane which he intends to construct. The model of this plane is shown in picture No. 1. It has served as a means to check the construction and balance that the full scale ship should have. To a certain extent, from the test flying of the model, even the flying characteristics of the large ship may be predicted with a considerable degree of accuracy. By applying this means to the routine of designing full scale ships in the future, it should be possible to build more stable airplanes; for the stability of the gas model may be readily ascertained. The model may be changed easily, quickly and inexpensively, until

Pict. No. 4. R. Davie and his Valkyrie win 2nd place at the Sydney, Australia, Meet

Pict. No. 6. Pick-a-back planes in flight at Houston, Texas, just before they parted

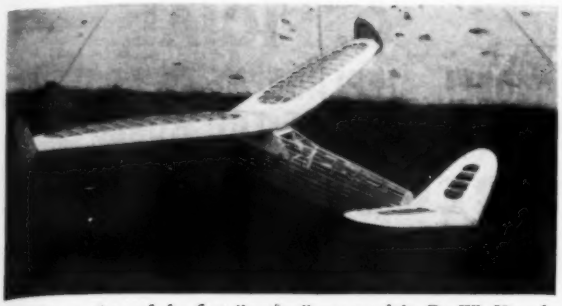


Pict. No. 5. A beautiful example of model construction by Rolf Rasmussen of Bergen, Norway

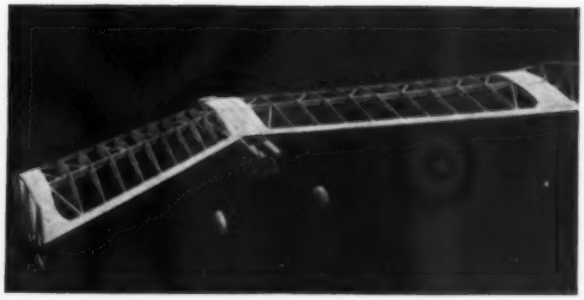


Pict. No. 7. J. Stratton (left) and G. Hartung with their gas jobs. They are members of the Poughkeepsie Model Club

Pict. No. 8. Thermal Riders of Nutley, N. J., assembled to compete in one of their recent contests



Pict. No. 2. One of the first "pusher" gas models. By W. Krecek

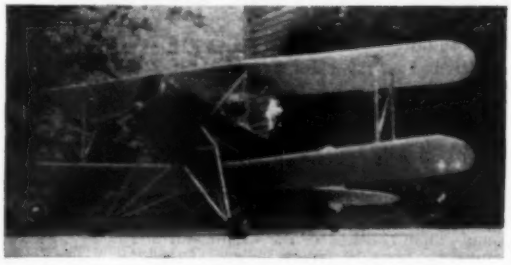


Pict. No. 3. Jim Scoville, Jr.'s tailless pusher

the best aerodynamic set-up for stability has been achieved.

The model shown here is a beautiful job and, as you can see, great care has been taken in its construction. It has a 5-1/2 foot wingspread, weighs 7-1/2 pounds and is powered with a Forster Brothers 1/3 hp. motor. A number of very successful flights were made with it before it was completely demolished by a squall which "came up" suddenly. A second model of this design, with slight modifications, is at present under construction. Mr. Lloyd says its value, from an experimental sense, cannot be over-estimated. The full scale ship, being built from this model, will have a span of 22-1/2 feet and will weigh 870 pounds, approximately. The power will be supplied by an Erco 65 hp. engine.

It is encouraging to see that gas model builders are not sticking to one particular form of design, but are putting into practice new and unusual ideas. Picture No. 2 shows one of these ships that is different. It is a canard, or pusher, type gas model; constructed by Bill Krecek of 621 N. Orange, Glendale, Calif. In general design it is similar to the twin pushers, except that only one propeller is used. The plane has a span of 48 inches and an overall length of 31-1/2 inches. The area of the wing is 300 square inches and is swept-back. The wing itself consists of 618 pieces and is built along the lines advocated by Carl Goldberg. It weighs only 14 ounces complete. The power plant is an inverted Ohlsson "23," which turns a 10 inch pusher-type propeller. Krecek says, "As yet no power flights have been made. The 'Outcast' has pronounced stalling tendencies at very low, or stalling, speeds. Upon leaving the hand it glides very nicely, even when thrown hard at a climbing angle, but a decided 'mush' occurs at the end of the flight."



Pict. No. 11. A "Great Lakes" scale gas job by J. Johnson

Pict. No. 13. Scrogg's plane in full flight

Pict. No. 12. Ados McKennon and his speedy 50-inch model powered with a 4/10 hp. engine

Pict. No. 14. Mr. Scroggs and his "arrow plane." It flies, apparently contrary to accepted theory

We notice a mistake in the design of this ship which is quite common, even to designers of full scale canard-type planes. Simply, it is this: The center of gravity is too far to the rear of the plane. The stalling characteristics of this ship at the end of the power flight or glide may be corrected very easily. The answer has been determined by a series of experiments and the following system advised is reliable.

The area of the rear wing times the distance from its center forward to the center of gravity should be 20% greater than the area of the front wing times the distance from its center to the center of gravity. If such a condition exists in a plane when the ship stalls, the nose will drop. If the recovery is not fast enough under these conditions, another trick which is effective is to give the front wing about twice as much

(Continued on page 66)

Pict. No. 10. A scene at the Cape Town Meet

Pict. No. 9. Baltimore has its day at the gas model races

N. A. A. OFFICIAL

MODEL AIRPLANE NEWS FROM ALL PARTS OF THE WORLD

1940 RULES AND REGULATIONS

Governing Building and Flying Model Aircraft In the United States

Adopted by N A A Academy of Model Aeronautics; Accepted by Contest Board of National Aeronautic Association
(changes and additions to 1939 rules are in Italic for easy reference)

CLASSIFICATIONS

ALL models *other than internal combustion powered models* are classed *by wing area* as follows:

Class A—A model is in Class A when the effective projected area of its main supporting surfaces does not exceed 30 square inches. The projected area is the area seen when looking down on the plane.

Class B—when the area exceeds 30 but is not over 100 square inches.

Class C—when the area exceeds 100 but is not over 150 square inches.

Class D—when the area exceeds 150 but is not over 300 square inches.

Class E—when the area exceeds 300 square inches.

DEFINITIONS

RISE OFF THE GROUND (R.O.G.)—A model airplane of the R.O.G. type has landing gear that permits it to take off from the ground or floor, starting from a standstill under its own power. The landing gear must be strong enough to support the model *in a normal attitude* while taking off and landing, and *in cases of doubt* its usefulness must be demonstrated by gliding the model from a height of at least four feet, landing without damage and without nosing over, *or striking a wing tip.* The wheels shall turn freely and be of such size and strength as to permit the model to taxi freely on an ordinary platform. The minimum diameter of the wheels shall not be less than the following:

Class A—½ inch Class D—1½ inches
Class B—¾ inch Class E—2 inches
Class C—1 inch

RISE OFF WATER (R.O.W.)—A model airplane of the R.O.W. type can take off from or alight on water. It must demonstrate its seaworthiness by floating five seconds. All surfaces and parts other than floats must be above the surface of the water and float unassisted. It must take off from the water, starting from a standstill under its own power.

AMPHIBIAN—A model airplane of the amphibian type has the combined characteristics of the R.O.G. and R.O.W. types, fulfilling these specifications without substituting landing gear. The model's time shall be the average of two flights; respectively, the best one of three R.O G. flights, and the best one of three R.O.W. flights.

HAND-LAUNCHED—A model airplane is hand-launched when it is released into flight directly from the hands of the launcher. The model shall not be launched from an elevation of more than six feet above the ground or floor.

GLIDER—A model glider is similar to a model airplane but without power plant. It may be launched in two ways: (1) hand-launched, (2) tow line-launched. Hand-launching is defined above. Towline-launching is accomplished by pulling the glider into the air with a string from the ground as with a kite. The towline shall be no longer than 100 feet and shall be released from the model by the launcher. The flight time starts when the towline is released. Model gliders need have no landing gear. The fuselage cross-section for towline gliders shall be $L^3/200$.

PUSHER—A model airplane of the pusher type has its propellers behind the main supporting surfaces.

TRACTOR—A model airplane of the tractor type has its propellers forward of the main supporting surfaces.

TRACTOR-PUSHER—A model airplane of the tractor-pusher type has propellers forward of and propellers behind the main supporting surfaces.

INDOOR MODEL—A model of the indoor type is designed primarily to fly indoors. The area of the effective main supporting surfaces shall not exceed 150 square inches.

OUTDOOR MODEL—A model of the outdoor type is designed primarily to fly outdoors. The area of the effective main supporting surfaces shall be not less than 100 square inches unless otherwise specified. Outdoor models shall weigh, complete and ready to fly, not less than three ounces avoirdupois for each 100 square inches of effective wing area. If ballast is used to bring model up to the required weight, it shall be securely attached so as to prevent its being dropped in flight. Outdoor hand-launched gliders shall conform to the weight rule of 1 ounce for every 50 square inches. Tow-line gliders shall conform to the weight rule of 1½ ounces for every 50 square inches of wing area.

STICK MODEL—A model of the stick type has a body composed of a single stick or open framework, rather than a fuselage. Models using tubes or a framework to enclose the motors shall have a total maximum cross-section area of stick not greater than $L^3/200$, where "L" equals the length of the stick. Outdoors, any type of power is permitted except internal combustion.

CABIN OR FUSELAGE MODEL—A model of the fuselage type has a built-up enclosed fuselage. The minimum area of the total maximum cross-section of the fuselage(s) must correspond to the formula $L^3/100$, where "L" equals the over-all length of the model, excluding the propeller. The fuselage shall be of streamline form and have not less than 90 per cent of its surface area covered. Outriggers and booms may be used on fuselage type models. The fuselage shall be a structure which supports the motor, wings, empennage and landing gear. When rubber is used for motive power, it shall be contained entirely within the model. A questionable model in which the classification as fuselage or stick is in doubt must be submitted to the Contest Director for approval before the contest. *Contestants must present to contest officials a full size drawing of the maximum cross-section of the fuselage for each different cabin model; drawing to be made on paper ruled into half-inch squares.*

FLYING SCALE MODEL—A flying scale model is an exact replica of a man-carrying machine, every part being proportional in size to the corresponding part of the large machine, with the exception of the propeller(s), which may be altered to suit the builder's wishes. *Full-scale outline drawing of flying scale model (i.e., same size as model) should be presented to judges to assist in checking accuracy of entries.*

EXHIBITION SCALE MODELS—An exhibition scale model is an exact non-flying replica of a man-carrying airplane, every part being proportional in size and location to the corresponding part of the larger plane. The N A A does not recognize any categories of exhibition scale models, but for the guidance of local contest committees, suggested rules are given. Any model or similar type of plane placing first to third in a national competition exhibition scale event cannot be entered in an ensuing national contest.

AUTOGIRO—An autogiro model is supported in flight by the action of the air on vanes which rotate freely on an approximately vertical axis, supplemented by the thrust of a propeller on an approximately horizontal axis. The area of the vanes' surface shall be not less than that of the fixed wing. There are no size-subdivisions of autogiro models. The launching method is optional, either hand-launched or R.O.G. The effective area of the supporting surfaces is considered to be the sum of the area of the fixed wing plus the area of the vanes. Autogiro models for outdoor records must conform to the weight-for-area rule.

HELICOPTER—A helicopter model must rise without any assistance and be supported in flight solely by the lift of a power-driven propeller or vanes. There are no size-subdivisions of helicopter models. Outdoor models must conform to the weight rule.

ORNITHOPTER—An ornithopter model derives its lift and propulsion solely from the flapping of wings. There are no size-subdivisions for ornithopters. Outdoor models must conform to the weight rule.

VACUPLANES, ROTOPLANES, and other experimental types are not yet classified or subdivided as they are not sufficiently standardized.

LIGHTER-THAN-AIR CRAFT are not yet classified.

CATEGORIES

The National Aeronautic Association recognizes official records in the following categories for junior, senior, and open competition. *Classification is by wing area except for internal combustion power categories.*

I-N-D-O-O-R-S

STICK MODELS
- Airplanes
  - Hand-launched ..... Class B, C
  - R.O.G. ..... Class A, B
  - R.O.W. ..... Class A, B
- Gliders
  - Hand-launched ..... Class A, B
- Autogiros
  - Launching optional, no classes for size.
- Ornithopters
  - Launching optional, no classes for size.
- Helicopters
  - Launching optional, no classes for size.

FUSELAGE MODELS
- Airplanes
  - R.O.G. ..... Class B, C
  - R.O.W. ..... Class B

O-U-T-D-O-O-R-S

STICK MODELS
- Airplanes
  - Hand-Launched ..... Class C, D
  - R.O.W. ..... Class C, D
- Gliders
  - Hand-Launched ..... Class B, C, D
  - Towline-Launched ..... Class C, D, E
- Autogiros
  - Launching optional, no classes for size.
- Ornithopters
  - Launching optional, no classes for size.
- Helicopters
  - Launching optional, no classes for size.

FUSELAGE MODELS (*Other than Internal Combustion Powered*)
- Airplanes
  - R.O.G. ..... Class C, D, E
  - R.O.W. ..... Class C, D

FUSELAGE MODELS (*Internal Combustion Powered—classed by engine displacement.*)
- Airplanes
  - R.O.G. ..... Class A, B, C
  - R.O.W. ..... Class A, B, C

CONTEST RULES

ACCEPTANCE OF RECORDS—No record is official until it has been accepted by the Contest Board of the National Aeronautic Association. Only duration records for flying models are officially recognized. All records to be eligible for recognition must be made in sanctioned meets or under specific direction of the Contest Board of the N A A. Application for recognition of National records must be made on official application forms *by N A A-appointed Contest Directors.* The Board shall be the final judge in the interpretation of all rules.

WHO MAY COMPETE—Contestants in any official contest for establishing records or for N A A trophies *MUST* be members of *the Model Division* of N A A. Contestants younger than 16 years are classed as juniors. Those over 16 but under 21 years are classed as seniors. Contestants over 21 are eligible for competition in the open class. There are separate categories of records for each group; the records being classed as junior, senior, and open, according to the contestant's age when the record was made.

OFFICIALS—All sanctioned contests, meets

(Continued on page 60)

Air Ways

News of Models and Builders in All Parts of the World

Pict. No. 1. Aldo Zeoli's contest model rides a thermal in S.A.

Pict. No. 4. The WPA builds models

THOUGH wintry weather in a large part of the United States has discouraged flying activities among builders of rubber powered models, fliers in Argentina are enjoying mid-summer weather. This is the time of year during which they are most active.

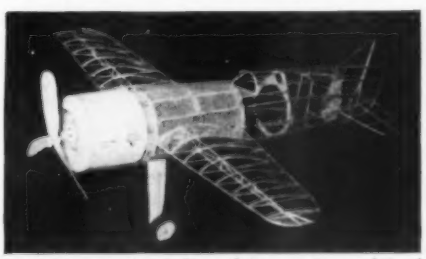
Perhaps many of our readers haven't realized that model building and flying is a great hobby in South America; but considerable activity is being carried on there though it is not extensively publicized. Argentina has approximately the same vigorous climate as the United States, which inspires the activity of young men in model aeronautics.

One of these young men is Aldo Zeoli who lives at 1183 Lapida Street, Rosario, R. Argentine. Picture No. 1 shows one of his models soaring just above the camera. This is quite a remarkable photograph, which must be credited to Carlos H. Patigo, a friend of Mr. Zeoli. In this case the model was not suspended but was in free flight. Mr. Zeoli says that the ship has made about 35 flights up to the time of writing, and on all of these it has given a remarkable performance. Once it flew out of sight and was found two miles away, after a two hours search.

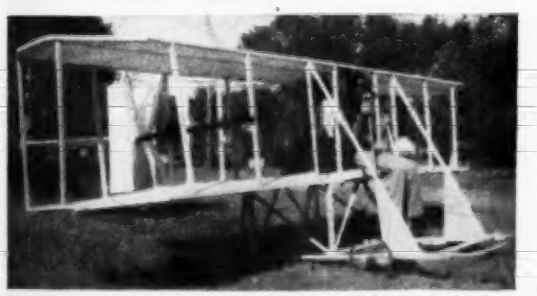
Mr. J. T. Suter of 636 Carpenter Street,

(Continued on page 34)

Pict. No. 2. A Grant Wakefield model by J. T. Suter



Pict. No. 3. An indoor flying scale model of Roscoe Turner's "Meteor" by C. Schuetz



Pict. No. 5. A seventeen foot model of an old Wright biplane

Pict. No. 7. Mr. Poppele and Stan Coe of WOR read the first educational radio facsimile on model aviation

Pict. No. 6. Lau Ka Yim and his model that won 1st place in the Hong Kong Model Plane Contest

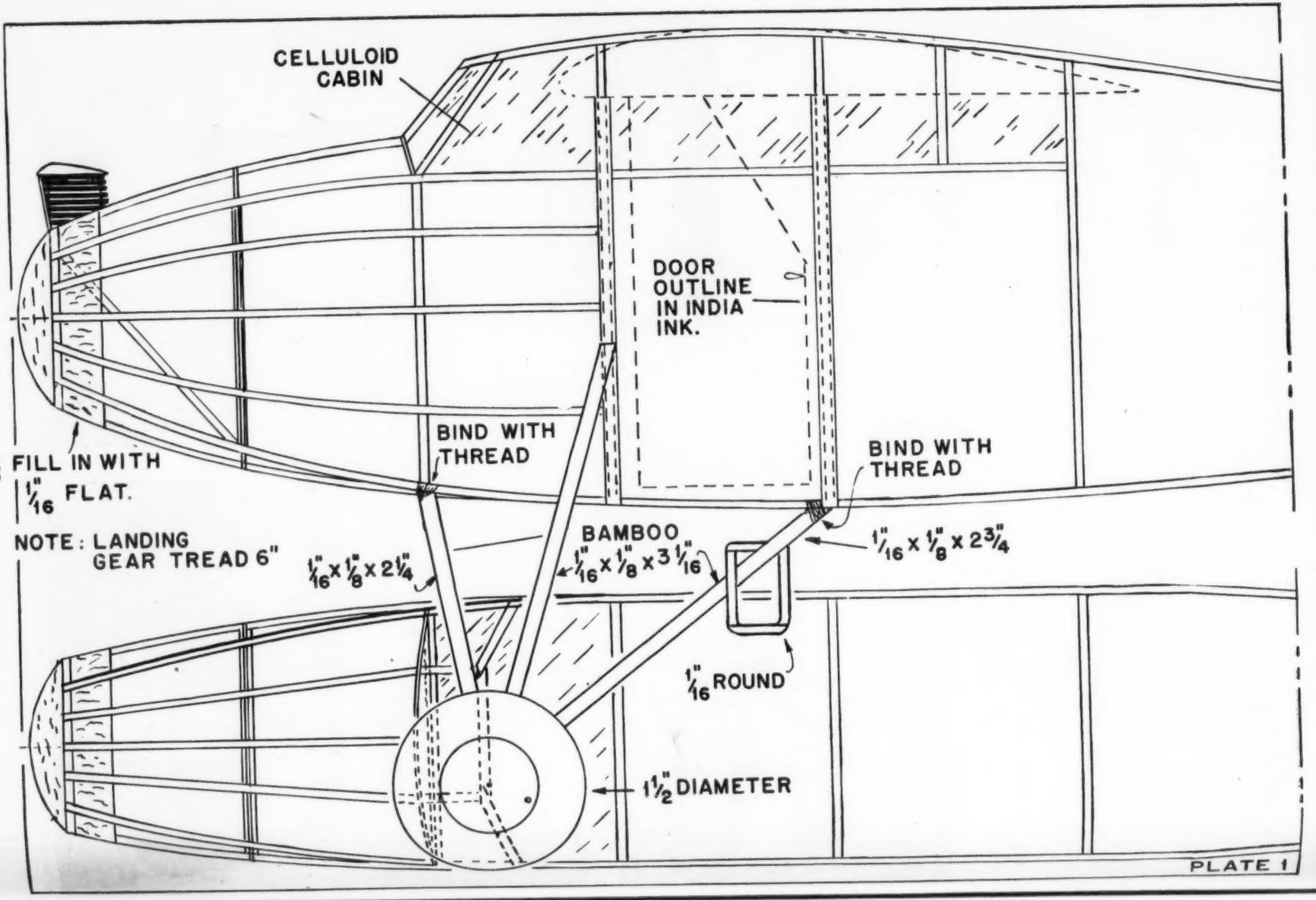

CELLULOID CABIN
DOOR OUTLINE IN INDIA INK.
BIND WITH THREAD
BIND WITH THREAD
FILL IN WITH 1/16" FLAT.
NOTE: LANDING GEAR TREAD 6"
1/16" x 1/8" x 2 1/4"
BAMBOO 1/16" x 1/8" x 3 1/16"
1/16" x 1/8" x 2 3/4"
1/16" ROUND
1 1/2" DIAMETER
PLATE 1

PLATE 1

BUILDING THE FLYING STINSON JUNIOR

The exact scale model in full flight

A Remarkable Performer that Fulfills Flying Scale Contest Requirements Exactly

By MIKE SOROKA

THE Stinson "Junior" has long been popular with flying scale model builders because of its close resemblance to a well-designed commercial and the opportunity offered for building up points in detail and workmanship.

The original design conforms with the old ruling that the propeller, dihedral and landing gear must be to scale. Even with these handicaps the model performed excellently, showing an unusual affinity for altitude and glide. Without a doubt, an increase in dihedral, a higher landing gear and a larger propeller will greatly increase the performance and these factors can easily be incorporated under the new ruling.

Fuselage

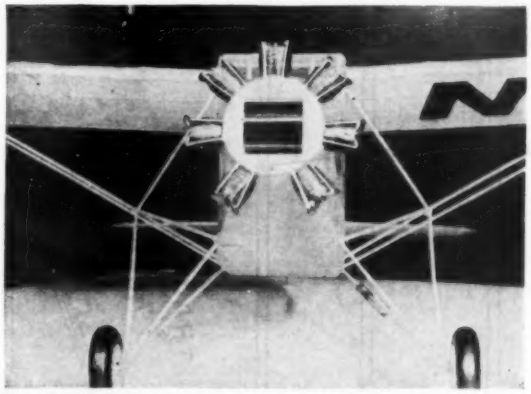
Study the plans carefully before actual construction and each step will be much easier.

First start by constructing the sides of the fuselage on top of either the drawing or a tracing using 1/16" square hard balsa. Pin the bottom longeron on the plan and then the top longeron from the front of the cabin to the tail post. Follow this by pinning the short longeron from the nose to the rear of the cabin, forming the base of the window outline. Glue the cross-braces in at this time, using plenty of glue and paying strict attention to the joints. Make the second side directly on top of the first and proceed in the same manner.

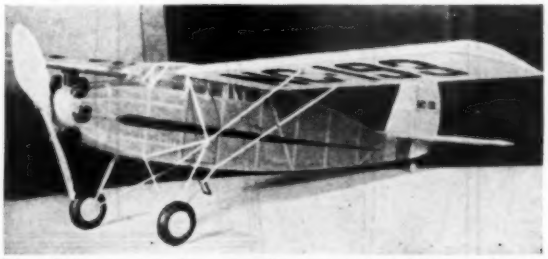
After the two sides are thoroughly dry, remove them from the board and separate them with a razor blade. Glue the top and bottom cross-braces in at this time, starting with those at the cabin and working toward the nose and tail post.

Cut the nose bulkheads and glue them in position directly on top of the cross-braces. Cement the 1/16" square stringers into position and fill in approximately 1/2" in from the nose with 1/16" flat to insure a solid foundation for the cylinders.

The cabin is finished at this time by placing the 1/16" square front windshield supports in place. It is important that the celluloid cabin be omitted until the wing is in position.



The detailed dummy motor and strut arrangement gives it a thrilling, realistic appearance

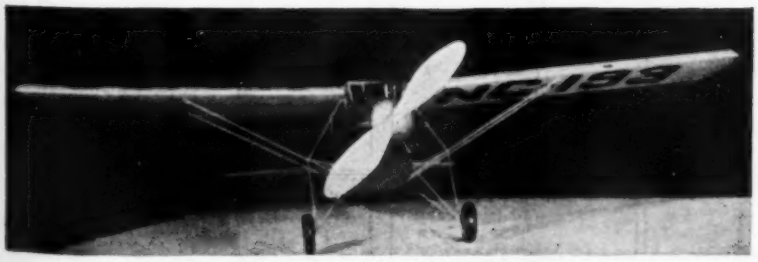


The design proportions provide unusual stability and performance without changes in the dihedral, propeller or landing gear

The section at the rear rubber mount is filled in with 1/16" flat and the inside block represented by dotted lines on the drawing is cemented cross-grain. A small oval hole just large enough for the bamboo rod is cut with a pointed razor blade and then sanded with sandpaper wrapped around a piece of music wire.

Construct the landing gear of bamboo and bind each joint into position. The wheel axles are made of .045 piano wire and these also are bound in place. The tread of the gear should be six inches from center of wheel to center of wheel. The wheels can be held on by turning up about 1/16" of the wire with a pair of long nose snipe pliers or by binding the end of the axle with thread coated with glue.

The plug is made of two pieces, one piece of 1/8" flat cut and sanded to fit the nose opening. This in turn is cemented on a piece of 3/8" flat. The plug is then shaped when inserted on the fuselage to conform with the nose. This can best be done by first using a fairly rough grade of sandpaper and finally a smooth grade. Several coats of dope is given the plug to increase its strength and appearance, sanding between coats. Two pieces of 1/32" sheet brass are then cemented to the front and rear of the plug, placed so as to give approximately two degrees negative and two degrees right thrust.



It resembles the full scale ship in all details

(Continued on page 44)

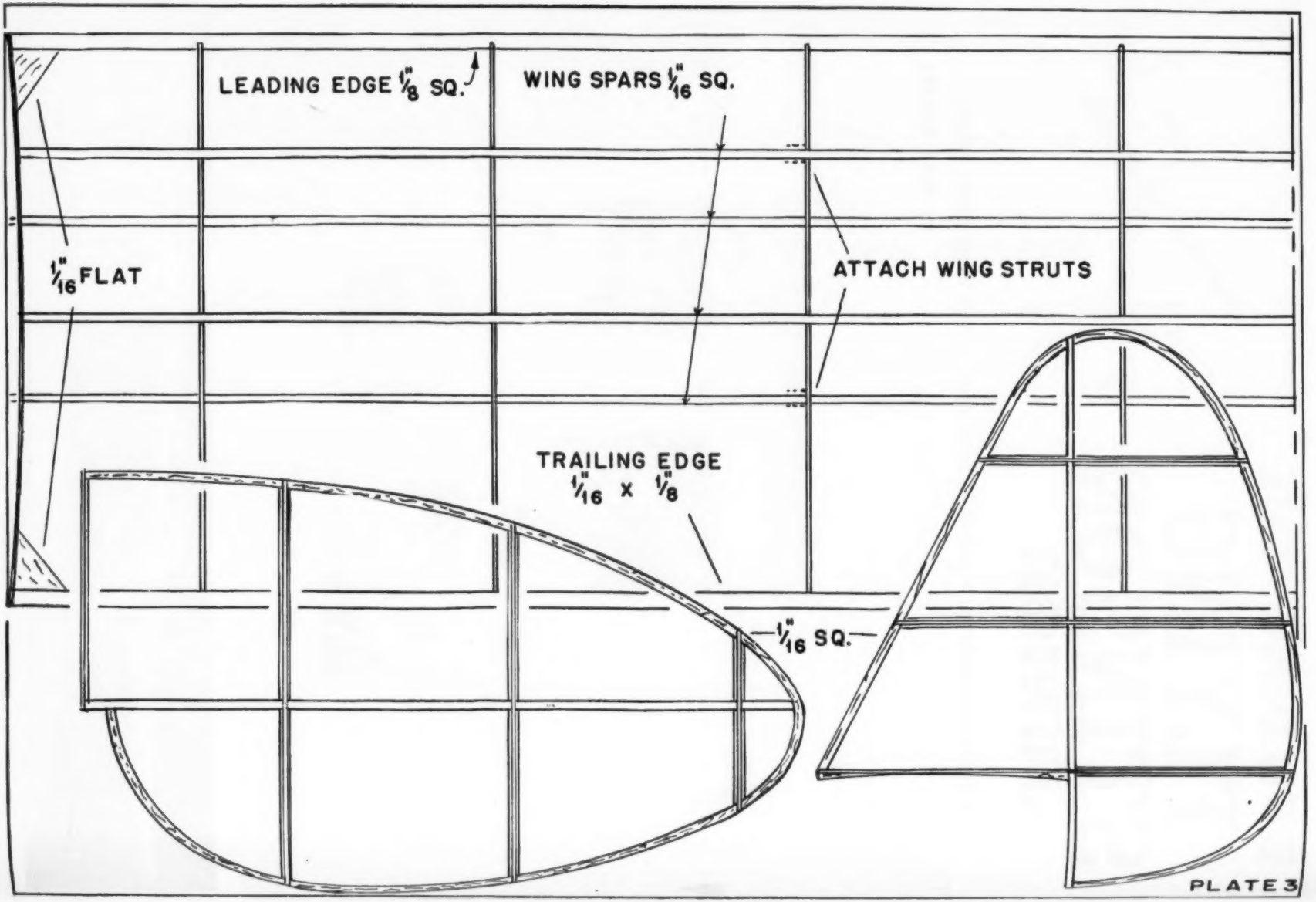

LEADING EDGE 1/8 SQ.
WING SPARS 1/16 SQ.
1/16 FLAT
ATTACH WING STRUTS
TRAILING EDGE
1/16 X 1/8
1/16 SQ.
PLATE 3

PLATE 3

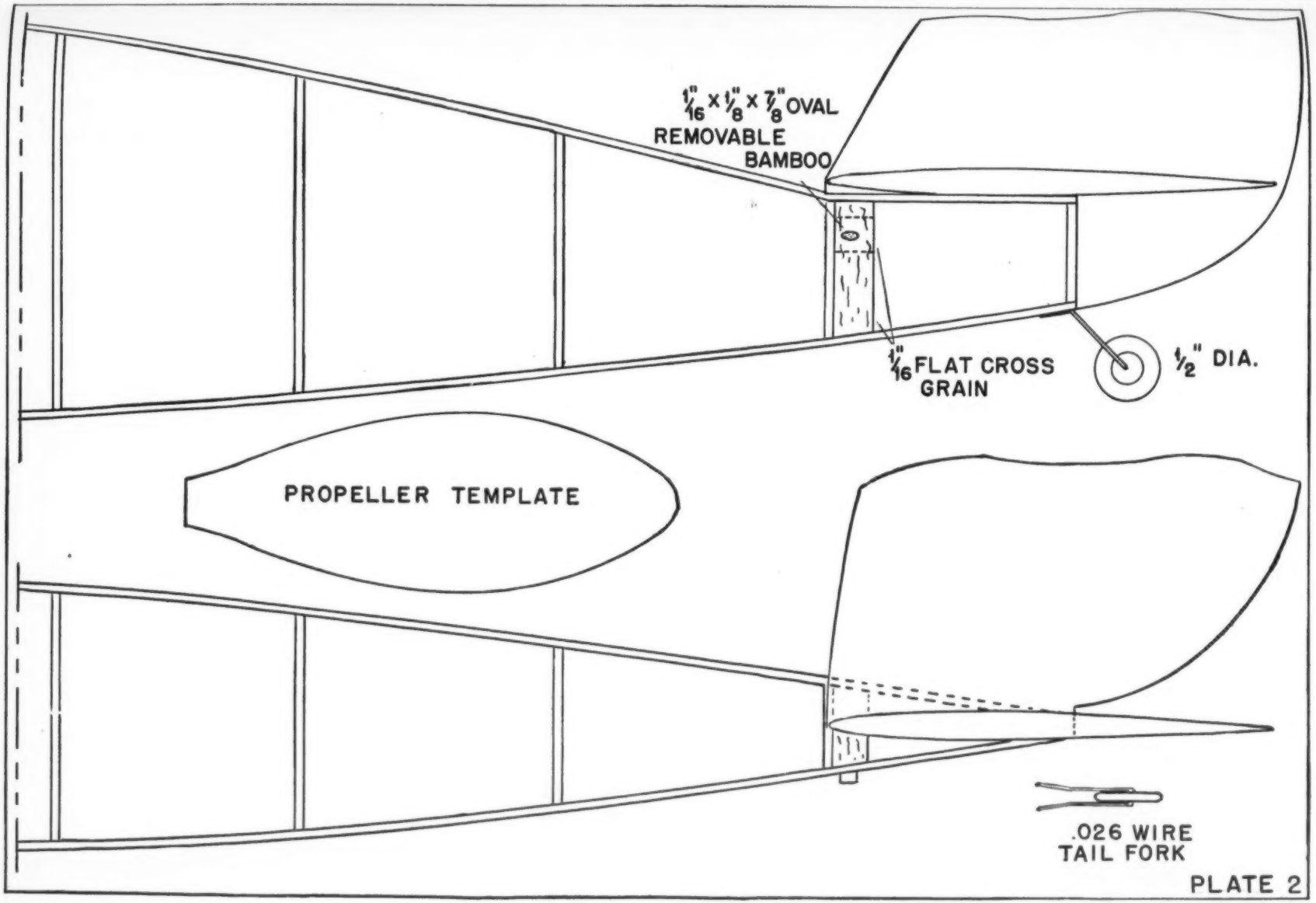
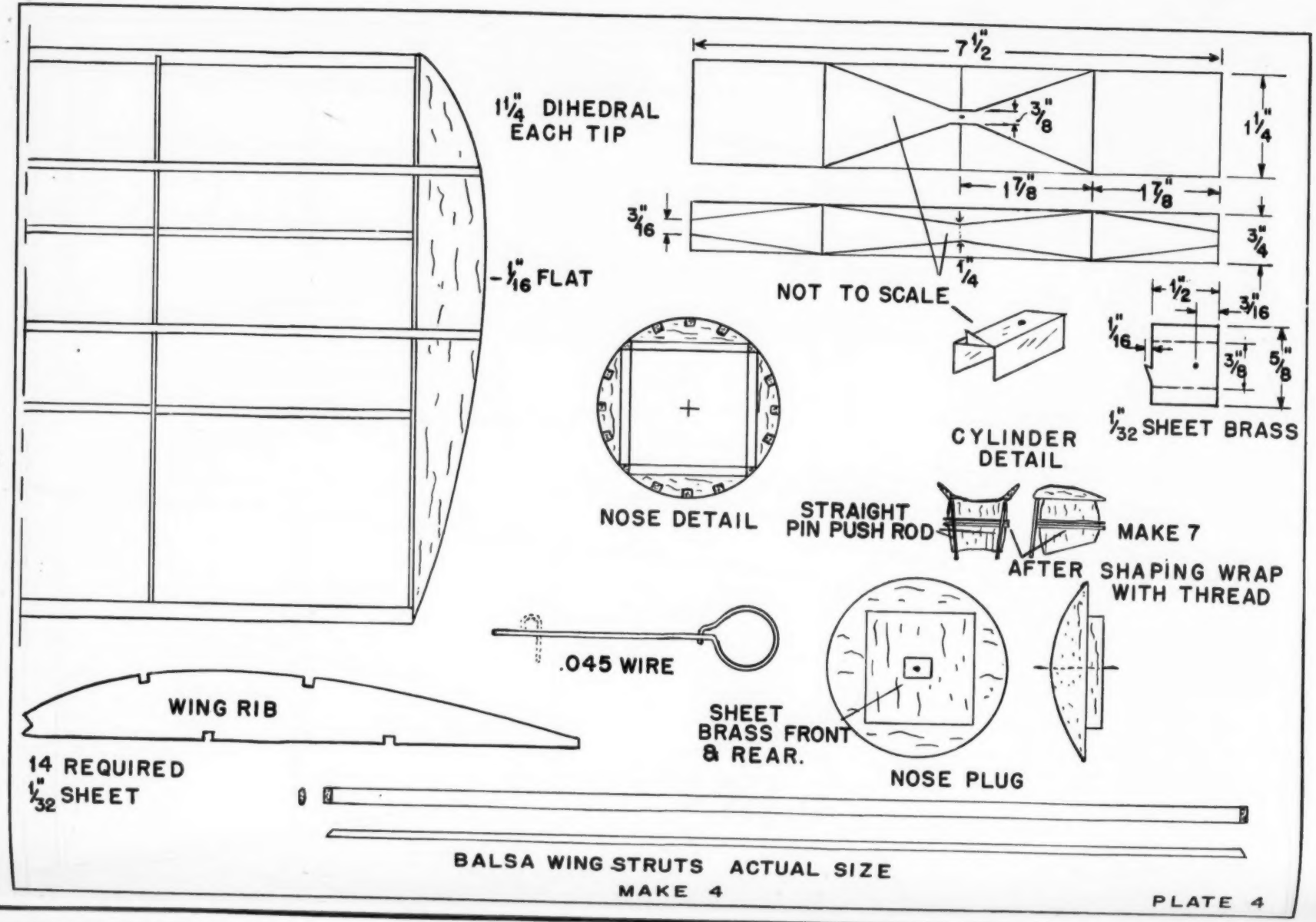


PLATE 2


1¼" DIHEDRAL EACH TIP
1/16" FLAT
7½"
3/8"
1¼"
1 7/8"
1 7/8"
3/16"
3/4"
1/4"
NOT TO SCALE
1/2"
3/16"
1/16"
3/8"
5/8"
1/32" SHEET BRASS
CYLINDER DETAIL
NOSE DETAIL
STRAIGHT PIN PUSH ROD
MAKE 7
AFTER SHAPING WRAP WITH THREAD
.045 WIRE
WING RIB
14 REQUIRED
1/32" SHEET
SHEET BRASS FRONT & REAR.
NOSE PLUG
BALSA WING STRUTS ACTUAL SIZE
MAKE 4
PLATE 4

FLASH NEWS!

BY ROBERT McLARREN

The Republic P-41A pursuit plane: one of the latest

ORDERED by the United States Navy: $20,016,699 worth of Consolidated XPBY-5A amphibian flying boats, the largest single order for airplanes ever awarded in the United States. Ship is the popular PBY model with retractable amphibian tricycle gear, the largest amphibian ever constructed.

Latest lightplane is the Model A constructed by William Durand, University of Omaha aeronautics instructor. Powered by three-cylinder air-cooled motor, the craft has a span of 30 feet; a length of 17 feet; a top speed of 100 miles per hour and a landing speed of 45 miles per hour.

Waiving its priority claims, the United States Navy has permitted the Brewster Aeronautical Corporation to ship 44 of the fast, stubby XF2A-1 single-seat fighters to beleagured Finland. The original order of 54 has been cut by the delivery of 10 ships to the navy. The navy's remaining 44 will be completed at the completion of deliveries to the Finns.

The odd, box-like Stearman X-100 twin-engine bomber which competed in the Wright Field competition recently held, has received an efficacious nose-lifting, a complete re-design of the fuselage and has received the designation XA-21. The huge ship is powered by two P&W Double Wasp engines model R-2180 which develop a power output of 1400 horsepower. A large order is in preparation by Stearman and air corps officials.

Los Angeles, long-neglected in centralized airport facilities, will soon have an airline terminal rivalled only by New York's newly-opened North Beach facilities. A one million dollar bond issue was recently voted by the city which entitles the municipality to 1½ million dollars federal aid. Mines Field, the Municipal Airport in Inglewood, California, has been selected as the site. American Airlines, TWA, Pan American, United, Western Air Express and Wilmington-Catalina airlines have pledged to construct hangars and facilities in excess of one million dollars.

Consolidated's long heralded XB-24 four-motored bomber made its debut a few short weeks ago and has been pronounced satisfactory by high ranking military authorities who conducted and witnessed the tests. Almost identical in every detail except size to North American's ill-fated NA-40 tricycle monoplane, this new behemoth mounts the famous Davis wing which features a high-lift low-drag section long dreamed impossible. Four Wright Duplex Cyclones of 1600 horsepower propel the giant through the air at speeds in excess of 300 miles per hour.

Consolidated has received a $4,700,000 order for patrol flying boats from an undisclosed foreign government. This, together with the recent $8,485,000 order for XB-24 quadri-motored bombers brings Consolidated's backlog to more than $65,000,000.

In addition to the original order for 100, Douglas has just received a $30,000,000 contract for 270 DB-7-B3 twin-engined attack-bombers (MODEL AIRPLANE NEWS, January, 1940, issue) from the French Air Ministry. A huge British order is being closed.

Additional Hudsons for England: Lockheed Aircraft has just signed a contract for 200 additional "Hudson" twin-engine light bombers at a cost of $20,000,000. The last 70 ships of the order will be equipped with twin-row Wasp engines supercharged for high altitude work . . . over Berlin??

Curtiss Aeroplane Division of Curtiss-Wright Corporation has just received a repeat order for 650 model P-36C-1 single-seat fighters from the French Air Ministry. This brings to a total of 800 ships in orders on hand from France.

Brewster Aeronautical Corporation has received an order for 80 of the popular XF2A-1 single-seat Navy fighters from the Belgian Government. The first 40 are to be delivered by mid-Spring and a sum of $5,400,000 is involved.

As a distinct shock to the aviation industry, Anthony Herman Gerard Fokker passed away in New York a few weeks ago. Tony Fokker was known by every veteran, participant and "kid in knee-pants" in aviation circles and his life was a foundation block for flying, military, commercial and sport. Inventor of the first synchronized machine gun, he made modern air-war possible and built fighting planes which were unequaled on the Western Front at their introduction. Said to be the first man ever to make a million dollars out of aviation, Tony Fokker will never really die in the hearts of aviation enthusiasts the world over.

The huge 18-cylinder Wright Duplex Cyclone has received an official rating of 2,000 horsepower by the CAA. First installed on the Consolidated Model 31 Flying Boat (MODEL AIRPLANE NEWS, September, 1939 issue), the powerful engine is now being installed in a dozen different secret military projects including the Consolidated XB-24, the North American XB-25, the Douglas XB-19 (six engines) and late Curtiss and Vultee pursuit ships.

First of Douglas Aircraft's huge Model DB-280 twin-engined heavy bombers for Canada have been towed across the Canadian Border in accordance with provisions of the Embargo Repeal Act which prohibits its crossing our continental limits in flight. Export version of the famed B-18A "shark-nose" bomber, the Canadian models are camouflaged with no identification markings to reveal them to the enemy.

North American Aircraft's new NA-35 primary trainer was just five weeks old the day it moved out into the sunlight. Setting an all-time record, the little ship went from preliminary proposal design to flight test in just 35 days! A huge order from the Air Corps' training division is pending. Latest contracts by the company are large numbers of single-seat fighter and two-seater dive bombers for Thia, or, as we used to know it, Siam.

The Canadian Government has purchased complete drawings, jigs and manufacturing rights to the Harlow PJC side-by-side monoplane trainer.

Homer Rankin won the Bernarr Macfadden cross-country trophy race, a feature of the Miami All-American Air Races by flying his twin-engine Beechcraft at a speed of 234.097 miles per hour average from Saint Louis to Miami. Russell Holderman, in a Lockheed Model 12, who started his flight from New York City was second; William Cason, from Houston, was third. Holderman, however, placed first in the 25-mile closed course Glenn H. Curtiss feature the following day, with an average speed of 198.312 miles per hour.

Richard Palmer, designer of Howard Hughes' famed streamlined bullet racing plane and Vultee's new "Vanguard" fighter, has originated a simple device which is said to completely conquer the stall of modern high-lift airfoil sections. Consisting simply of tiny strips of wood placed along the leading of the wing, the gadget doesn't kill stalls, but directs them along the wing, giving the pilot time to nose out.

Final action on the Douglas DC-4 tangle has been taken with the complete re-design of the ship and the ordering of 40 of the new-types by four of the nation's biggest airlines at a cost of $14,000,000. Smaller, and radically different, the newer, faster, more luxurious DC-4 will be delivered in 1941.

The air corps has called for bids on autogiro's for a competition to be held at Wright Field within 90 days. The army has six autogiro's in service-test status at the artillery school at Fort Sill, Oklahoma. Congress has authorized $2,000,000 for purchase and experimentation with this strange craft.

Air Ways

(Continued from page 27)

Columbus, Ohio, sends us picture No. 2, showing his Grant Wakefield model, the "Tsetse Fly," which he completed and flew in a recent contest at Portsmouth, Ohio. He won first place with only two trial flights, even though the plane was not equipped with a folding propeller. The model varies from the original design only in the fact that the polyhedral in the wing has been eliminated. Mr. Suter says it flies beautifully with the dihedral and fin area shown. Of course many readers will realize that there is a definite relationship between the fin area and the dihedral; the larger the dihedral, the greater the fin area should be. A fin area of 12% of the wing area, for a dihedral of about nine degrees, is the minimum that should be used. The model, complete with 32 strands of rubber, air wheels and a 17-inch prop, weighs just 8.25 ounces. One of the features of this model is the adjustable wing. The mount, which is glued to the wing and holds it above the fuselage, may be slid along the fuselage, forward and backward, in order to adjust the balance of the ship. This mount rests over a strip of hard wood glued to the top of the fuselage along which it is moored. This keeps the wing from slipping from one side to another. The whole assembly is held rigidly to the body by two rubber strips, which may be seen in the picture.

Probably a great deal of the lack of interest in indoor contests, which has been evidenced lately, has been due to too much standardization in this type of ship; the indoor flying rules having restricted the designs of these ships to such an extent that one ship looks almost like another. This disinterest is also probably due to the fact that through long experience indoor builders have arrived at the most efficient design in indoor planes; consequently all such planes have similar design and structural characteristics.

Lately, however, new life has been injected into indoor flying by the advent of extremely light, microfilm-covered scale models. Such models give a wide range of choice in respect to design and construction and therefore should stimulate the interest in this type of ship as well as contribute greatly to the model builders' engineering technique and information. An excellent example of this new type of indoor plane is shown in picture No. 3. It is a replica of Roscoe Turner's "Meteor," and was built by Curt Schuetz of 2814 West Melrose Street, Chicago, Illinois. Schuetz is a member of the Illinois Model Aero Club, 420 South Michigan Avenue, Chicago, which has been holding indoor contests for many years.

Though the model has been built to exact scale, it has an excellent glide and is very stable. It has been made light without sacrificing strength. The spar in the wing is built up as shown in the picture, making it stronger and lighter than a sheet balsa spar. The landing gear strut is hollowed, being made of a sheet of 1/64" balsa, steamed to shape.

The head resistance, due to the large cowling, has been reduced by making the nose of the plane pointed instead of the cowling. Thus the air passes from the opening in the nose and passes out through the cowling through the vents between it and the fuselage at the rear. In effect this acts as a slot and tends to keep the flow of the boundary layer of air along the fuselage smooth. Thus instead of added resistance due to a blunt nose, considerably less resistance is developed because of the smooth airflow. The three-bladed prop gives plenty of power.

Picture No. 4 shows one of the members of a class supervised by the WPA in Kansas. Model airplane work has been taken up extensively by this organization and clubs have been formed in nearly every state. This means has been very successful in educating young men in the fundamentals of aeronautics. In past years this club work and distribution of aeronautical information has been carried on by individuals who have recognized its value to the community and the nation. This has been done, in most cases, at the personal expense of the individuals. Much of their work has gone unheeded, but we wish such public-spirited men to know that their sacrifices are recognized by MODEL AIRPLANE NEWS magazine. It is a great step in the development of aeronautical knowledge to have government agencies take up and promote this work among young men.

Take a good look at picture No. 5, . . . No, this is not one of the original Wright biplanes; but only a seventeen foot model of the early flier. Don Fuqua of 206 East Jefferson Street, Fairfield, Iowa, who is president of the Fairfield Aeronauts, sends us this picture and tells us that it is a model of the first plane to fly at this city. It was built by the club members on the occasion of the Centennial of the settling of Fairfield. One of the club members, Frank Swink, Jr., was at the controls. The ship was built to an exact scale of six inches to the foot. During the Centennial celebration the club had a booth and displayed several models. It also had a Model Builders' Register in which builders from Illinois to California registered. The model cost approximately $7.50 and required seven weeks to build.

The youth of China have taken up model airplane building in a serious way. Of course students of aeronautic history will recall that kite-flying was a national sport of China hundreds of years ago. Mr. Lau Ka Yim of the Nam Yut Academy, Sheung Shui, Hong Kong, Trophy Winner of the Hongkong Model Airplane Competition held November 12, 1939, sends us a picture of himself, No. 6, holding the model which won the contest. This model appeared several months ago in MODEL AIRPLANE NEWS. Mr. Yim says it climbs at 70 degrees and has a glide of 1 to 30. This is exceedingly remarkable inasmuch as the most efficient wing on record glides at approximately only 1 to 28; and this without any fuselage, propeller or rudders. Unquestionably the ship has an excellent glide but we quite doubt whether it is within the realm of possibility to attain this degree of wing efficiency. The model won the contest with a flight of 3 minutes, 35 seconds.

(Continued on page 61)

Build **ANY** *of these models and be eligible for the Big 1940*

MEGOW Prizes

MEGOW *Rubber-Powered* MODELS

are also eligible entries in contests featuring the big Megow cash and merchandise prizes to be offered all over the country during 1940!

Turned Nose Cowling on all round nose flying models, MOTOR HUM DEVICE on all flying models priced at 25c or more.

INSIST upon MEGOW Models at your Dealer's. If he can't supply you, write to us direct.

POWERED CABIN CRUISER $3.95

By mail, post. 20c extra

Model of a fast, seaworthy cruiser. Balsa wood makes construction easy. Real mahogany superstructure. Spring motor, 5 minutes drive. Rudder controlled by steering wheel in cabin. Includes motor, fittings, detailed plan and all materials. Length 17 in.

NOW . . . a whole FLEET of SOARING *Eagles* $2.95 UP

"Every inch an airplane" in appearance and performance, Megow's SOARING EAGLES command the admiration of all eyes at every gas model meet. Designed to stay out of loops and not to "hang on their propellers," Soaring Eagles speed aloft like rockets, soar around like observation planes and glide slowly to long, level landings. 3-Unit construction . . . monocoque fuselage, wing section and tail section both quick-detachable to fly off undamaged in collision. Cockpit for ignition open when wing unit is off. Midwing mounting avoids looping. Finished propeller.

CLASS A. Wingspan 46". Uses any Class A motor . . $2.95

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CLASS C. Wingspan 6 ft. Uses any 1/5 h.p. motor. Puncture-proof wheels $4.95

Any size, by mail, 20c postage extra

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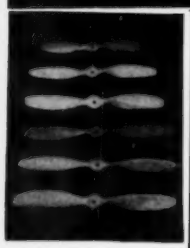
2 New 194



MODELCRAFT GAS MODEL PROPELLERS

9" 25c
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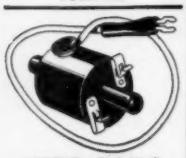

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2 ounce 1½ volt coil.....$3.00
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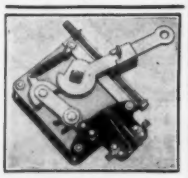

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Small size, only 1¼ oz. Setting of a knob gives the desired time 100% accurate and guaranteed. See the new Scientific Robot Timer at your dealer or order direct. **$2.50.** Postpaid.

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3½" dia., ¾" wide, tread designed to reduce side slipping, brass wheel bearing ⅞" long. Net weight approximately 5 ounces each. **$1.25** Each Postpaid

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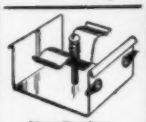

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Penlite size ¼ oz. 40c
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PROP. SPINNER....25c

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"KNEE ACTION" TAIL WHEEL UNIT

Only 75c. P.P. Postpaid

60¢ EXHAUST MANIFOLD

Look

LOOK camera man caught the Scientific "MERCURY" in action and printed this picture in Dec. 5, 1939 issue.

THE MERCURY

When a leading picture magazine sends a special camera man out to photograph the SCIENTIFIC "MERCURY" in flight, there must be something unusual to make this model such important news. Look Magazine did that and the reason is simple . . . SCIENTIFIC "MERCURY" is so outstanding in both appearance and performance that she is really in a class by herself. A number of transport aviators have said that here is a model that acts and performs like the real big ships they fly. Our engineers have incorporated a balance that eliminates imperfection but insures straight and fast flying. The slow roll after the motor cuts brings her out on top as she starts her long, fast glide to earth, making it appear that she is actually being handled by a human hand. It has staggered tail surfaces, as protection against spinning; a tapered wing, for greater flying efficiency and a reinforced front end for the nose to successfully enable this gas model to withstand severe motor vibration and the impact of landing. Wingspan 6 ft., over all length 52". Weight complete with motor and ignition units 2¾ lbs. The kit is complete with all necessary materials including a pair of 3½ in. streamline balsa wheels and a full size plan with complete directions. Go to your dealer today to see this Scientifically designed airplane. Postpaid..... **$4.95** less motor

Dick Korda's VICTORY

Wingspan 32". Length 23". Fly her to victory in your next contest.

ONLY 50¢ EACH AT YOUR DEALER OR POSTPAID

At last! Korda models as only quality model airplane kits, can powered models DESIGNED TO Moffatt and the Wakefield trophy petition. The accompanying pl simple construction employed Scientific high grade selected plan complete with numerous with the great designing ability that the Victory and the Gold built.

Test flights have proven that ers everywhere like to construct fast, graceful spirals consistent and frequently coming down f

You beginners get off to the Korda models. Whichever one couldn't ask for a better flyin specifications so use them in y

KIT INCLUDES: Formed wire balsa, and many other features to

"The Flea" Gas Type Winners **"Firefly"**

Wingspan 36"—length 28"—weighs 3 oz. Kit contains everything; including M & M wheels, dummy gas engine, postpaid **$1.95**

WINGSPAN 36"—LENGTH 28"—FLIES 1 MILE. Looks and sounds like a real gas job. Kit 100% complete including M & M pneumatic wheels. Postpaid **$1.95**

"Miss America"

40" WINGSPAN—LENGTH 27½"—FLIES 1 MILE. An easy model for the beginner. Kit 100% complete including M&M wheels, postpaid **$1.95**

"Valkyrie"

WINGSPAN 24 inches—LENGTH 15 inches—WEIGHT 1¼ oz. Formerly sold for $1.00. Complete with full size plan and many finished parts. Postpaid..... **50c**

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...en 32". Length 22½".
...ll as she takes her place
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...right off the ground, climbing in
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...illustrated plan, carefully selected
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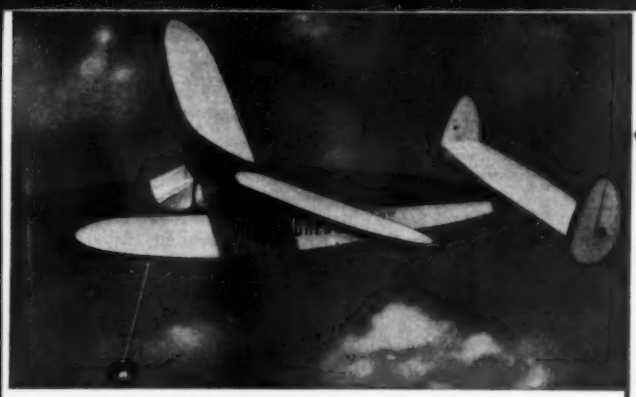


MISS WORLD'S FAIR—30" Wingspan

The New York World's Fair has closed its gates until next spring . . . but there is no interruption in the popularity of SCIENTIFIC "MISS WORLD'S FAIR." It is speedy two ways. First, you can build it in a jiffy and, secondly, she will quickly climb and make at least a half mile before alighting to a perfect 3 pt. landing. Wingspan 30"—length 20". Kit furnished complete with full size plan, selected parts and accessories. At your dealer or direct, **50c** postpaid. **50" wingspan—$1.50 postpaid.**

THE ORIOLE

50" wingspan; over-all length 34". It conforms with the N.A.A. contest requirements and boasts of many cups won from Maine to California. Postpaid direct.... **$1 POST-PAID**

SCIENTIFIC GLIDER

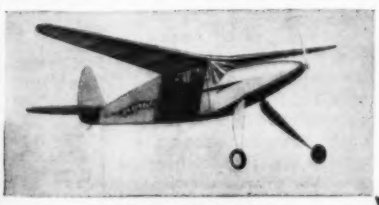
Boasts of record flight of over one hour. Wingspan 20¾", length 18". SCIENTIFICALLY streamlined to combine beauty with performance. Build it in a jiffy and get the thrill of a lifetime. Complete with full size plans and instructions. ..... **25c** Postpaid

FLYING YANKEE

Wind her up fully and set her on the ground—let her go—and watch her race along for 2-3-4 feet, her tail lifts, and the wheels leave the ground with the grace and stability of a transport. The model noses up steeply and climbs at an amazingly high rate of speed. Upon reaching its ceiling of 200 feet it levels off, flies in 30 foot circles, and then power shuts off, and it goes into the neatest flat glide you ever did see, coming in for a three point landing. See your dealer now and build a "Flying Yankee" ..... **25c** Postpaid

THE FLEETWING

The "Fleetwing" is the year's outstanding record breaker. The simplified Scientific method of construction makes this model the easiest of all flying models to build. Wind motor fully until a row of knots form; set model on runway and she's off like a bullet after only a 3 foot run. She's heading straight up and climbing at the amazing rate of 600 feet per minute—at a height of 250 feet the model levels off and cruises for 1,000, 2000, 3,000, and often even 5,000 feet..... **50c** Postpaid



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Contest model. Length 20½". Flies over 1 mile. Has detachable wings. Classy cabin. See all its many features at your dealer..... **50c** Postpaid

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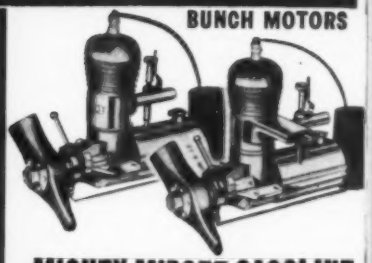

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AIR STREAM UNIT Same as Standard Airstream less coil and condenser. ..... **$13.85** postpaid

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Bore ½" Stroke ½" Weight 2 oz. 17,500 RPM

$12.50 Complete Postpaid

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Forster Bros.

Bore 1-1/16" stroke 1⅛", ½ H. P., 2 piston rings, ball bearing, weight 14 ozs. Model "B", Air cooled. With bronze main bearing $17.75
Same as above but with Precision Aircraft Ball-Bearing Main Bearing.... ..... $19.50

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ALL-ALUMINUM 1-PIECE BODY RACE CAR KIT

★ Wheel Base 12⅛"—Overall size 22½"
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★ Construction time—2 hours, 14 minutes.
★ Highly polished aluminum shell, exact scale model of championship racing car. (less motor) $12.50 p

10,000 Planes to Service

(Continued from page 7)

and farther than the planes of any enemy the strength of the foe is greatly diminished. That is from the offensive standpoint, only. What about defense? The most efficient planes in the world can't ward off a hundred bombers!

And so, America plans to build—not just new planes and more planes, but superior planes, for an air force that will be second to no other nation's.

To the average citizen this means increased spending for armaments. More taxes. The public is willing to pay for its own protection when it knows it is to be well protected. It is sure to ask questions, however.

How much will these planes cost? Who is going to build them? How fast will they fly? Will they be able to fly over the Atlantic, the Pacific? Who is going to fly them? How large will they be? When will they be ready? Will they be superior?

That is what the "man on the street" is thinking. He is entitled to ask questions, for it is his air corps, for his protection built with his money. He may be drafted to serve as a part of it in time of war.

If you asked these questions of an air corps officer or one who is closely associated with the air corps' activities, his response would be an indefinite answer because he cannot tell most of the information demanded. However, there is little hesitancy on his part to say that the new expansion program will create a great many new problems. Most important of these can be boiled down to four —production, personnel, experimentation and maintenance.

The task of building eight thousand new planes to increase the present total to the proposed goal of ten thousand, creates a big problem. Before any of these planes can be accepted into service they must pass rigid performance tests and undergo various experimental changes which will bring their characteristics up to the most efficient standards known. Then, after they are built, Uncle Sam must train new men to fly them. Then too, they must be kept in perfect condition, ready at all times for active service.

Although each of these tasks is of vital importance, the big worry which will keep air corps personnel on the run can be centered around one word—UPKEEP.

Mass production of airplanes to meet the demand can be accomplished by speeding up the assembly line. Already the North American Company has reached the stage where it can turn out three and four complete airplanes a day. Most of these ships, however, are being used to met a great export demand. Boeing, Douglas and Serversky, not to mention Curtiss, all of which hold government contracts, also are capable of meeting the demand by increased working.

Expansion programs have been in progress for the past year or more at the army air corps training centers, Randolph and Kelly Fields. A newly proposed private flying instruction plan has been received with favorable belief that it will help relieve some of the training problems.

Experimentation is routine for Uncle

Sam. Wright Field engineers are constantly working over plans and experiments. But the question. . . . Who's going to keep them in order, and flying? . . . is the problem which no one likes to bring up for discussion. Airplanes that aren't safe or won't fly are of very little value. Therefore, this business called UPKEEP is worthwhile thinking about.

Recent pamphlet material released for publicity purposes about a commercial airline, boasts that the airline, to assure safety to its passengers, keeps ten men on the ground for every plane it has in the air. This means that for every airliner that lifts its silvery nose into the sky there are ten men on the ground who keep the ship in working condition.

They called them "greasemonkeys" during the war-days, but the mechanics who keep the air giants "in the pink" today have to possess a keen knowledge of aerodynamics. The great all-metal planes have a million different operations and the men who look after them must know something about each. Those who apply their mechanical knowledge and craftsmanship to the winged monsters are the unsung heroes of aviation. How many lives they have saved no one will ever know.

Unlike those days of 1917-18 when pilots were rushed into ships which sometimes wouldn't hold together, today Uncle Sam keeps a watchful and protective eye out for his war-birds and consequently only the most expert mechanics work on the military planes. They are trained men who know military aircraft from A to Z and their number must be greatly increased to care for the new flock of fighting planes which the army plans to build.

Taking a conservative figure in comparison with the commercial airline report, there will be needed at least an average of five men to the plane to maintain the proper care for the war-birds when they are "grounded." This will mean an additional fifty thousand men for the air corps, half as much as the standing army of the U. S.

The interesting story, however, is not how Uncle Sam plans to meet the problem; there are numerous ways already under consideration, but a *behind the scenes* account of what happens to army planes on the ground is enough to arouse anyone's curiosity.

Already in existence to meet the supply and repair demand necessary for the maintenance of airplanes for the army are air depots located in various sections of the United States and its possessions. Patterson Field at Fairfield, Ohio; Dunken Field in San Antonio, Texas, and Scott Field in Illinois are three of the important supply and maintenance stations. Others are located at Middletown, Rockwell, the Canal Zone and the Philippines. These centers are geographically located to correspond with the division areas of the air corps' tactical units. Thus, each group of tactical squadrons has its own base station where maintenance work is carried out. Only when aircraft requires a great amount of new material for its repair job, however, are the planes shipped to the depots, minor repairs are made at the base station of the squadron.

The work on the ground today is far different than that of yesteryear, before the all-metal ships came into being. There is little doubt that the new planes are more efficient than their ancestors, but their construction is far more detailed and minor damages mount up rapidly, especially since military flying is strenuous work for any plane.

There is no regular "check" for military planes as is the case with all the commercial airline ships which must undergo a complete over-haul every five hundred hours. Army planes are expected to be always in prime condition, and only when trouble is located does the ship go to the repair station.

Busiest of all maintenance depots is Dunken Field near San Antonio, and there is a just reason when the boys who have never waddled a joystick before start bouncing Uncle Sam's training planes around on props and noses. Located near Randolph Field where Uncle Sam trains his birdmen, Dunken Field gets all the ships which student flyers "wash-out." Any damage, from a cracked prop to a demolished wing or fuselage, must be repaired at this base repair station.

The only way to find out just what goes on when a plane comes in for repair is to ask one of the mechanics. His answer will be something like this—"Anything can happen to an airplane, and we have to find out what has happened and then fix it."

From the many enlisted men and officers who work at the repair bases one soon learns that the main troubles which develop in army aircraft are motor ailments and structural weaknesses. Because engine failure was becoming frequent in certain makes of engines the army was forced to ground certain planes last year until the trouble was discovered and improvements made. The structural weakness of army aircraft must not be con-

MEGOW'S GAS-POWERED MODELS

SOARING EAGLE 3-unit construction—fuselage, wing-section and tail-section—easy to build, transport and fly. Cockpit open when wing-unit is off. Climbs at steep angle without hanging on propeller. Low-mounted wing avoids all tendency towards looping . . . **$2.95** up

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New construction ideas, most practical size. Megow's hollow-carved Leading Edge. Scale spacing of struts and ribs in wings and fuselage. Span 52 3/4". Length 33 1/2". Uses any 3/8" motor.

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World's Champion QUAKER FLASH $4.95 *Plus 20c Post.*

Cut-out propeller. Extra hard balsa wood, sheet aluminum for cowl and all necessary parts and supplies. Wings removable and gear folds back for carrying. 3 1/2" puncture-proof wheels. Span 67". Length 47".

Insist upon Megow's

Introdu

Korda's International Championship Winner

The authentic kit for building this sensational winner for 1939. A model of great beauty as well as aerodynamic perfection, made exclusively by Megow's under the supervision of its designer. Contains Korda's authorized plan and all necessary materials carefully selected for the purpose. This model conforms exactly to contest requirements and enables you to construct a model of marvelous performance and rare interest.

COMPLETE KIT, $1.00
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FLYING SCALE MODELS. Biggest value ever offered for the price. All details of the original ships retained. Motor Hum Device. Turned Nose Cowling. STINSON, WACO, MONOCOUPE, AERONCA, and others. (By mail, postage 10c extra.) **25c**

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Two Sensational New Flying Scale
PURSUIT MODELS!
23-INCH WINGSPAN
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Extra Hard . Black Ends — **Medium . . . Red Ends**
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Dead Soft . . Yellow Ends

What is Color-Coding?

Color-Coding is a system used in industry to mark materials so that production men can select the kinds of steel or grades of material specified by the engineers on the blueprints.

Why Megow Balsa Wood is Color-Coded

As aeronautical engineers, model builders must draw detailed plans and use specific materials to design and build their planes. Light balsa here, heavier balsa there, and extra hard where strength is needed.

Megow Balsa comes in many degrees of hardness, and wonderful machinery has been perfected to cut it into strips and sheets of the desired dimensions. Color-Coding identifies the various grades for model engineers.

You may now design your model, and obtain from your dealer exactly the right kind of wood to build each part. The ends of the sheets are colored according to the code given above, so you may be sure of getting exactly what you want.

Insist upon Megow's Color-Coded Wood. It's quality assurance.

MEGOW'S AIRCRAFT DOPE

Super quality. Brilliant, rich in color, smooth-flowing, quick-drying, fine for spraying. Colors dense—can be thinned to about 50% and still have wonderful coverage. The same quality used on big planes.

Sizes from 5c up—at your dealer's

SEND FOR COLOR CARD

MEGOW'S KWIK-DRI CEMENT

Quick, firm - gripping, transparent, waterproof. Easy to use, and economical. Tubes, 5c and 10c. Larger sizes in cans and bottles, prices listed in catalog.

SEND 5c POSTAGE FOR BIG, NEW 1940 CATALOG!

AIRPLANES, SHIPS AND HO-GAUGE RAILROADS

fused with poor construction for under certain tactics which result from acrobatic flying even the strongest of planes sometimes "give way" to the breaking point. These two reasons cause most of the army's planes to make visits to the repair shop.

Time was when planes were considered large ships if they were powered with three motors. Today the army has thirteen four-engined "Flying Fortresses" to care for. This makes the motor repair problem a serious one.

There are any one of a hundred things which can happen to a motor. Pistons, spark plugs, crank shaft, every vital part is pressed to its working capacity in the airplane engine and naturally sometimes something is likely to go wrong. When this happens, if the result isn't fatal to ship and motor, the engine goes to the repair shop.

Hundreds of thousands of dollars are tied up in aircraft engines and it is important they be repaired properly. Expert mechanics at the repair base study the proper equipment necessary to make repairs which might be needed.

In the science of aircraft engines army mechanics and technicians are the most accurate in the world. Their inventive genius has brought into being intricate machines which test metallic flaws and sometimes prevent future disablement by discovering defects which are in the making because of metallic deterioration.

The workshops at Dunken Field give the observer an idea of how this motor repair work is carried on. Long lines of motor mounts with motors knocked down and partially assembled are in evidence. Groups of mechanics work over each engine giving it scrutinizing inspection and replacing worn-out parts.

Most of the engines in use today are of the radial type and workers claim these are easier to work on than the long cylinder type. Each individual cylinder is completely overhauled and checked once an engine is brought in for repair. When the motor leaves the repair shop it is practically like a new engine.

The powerplant branch of maintenance is less interesting to the layman, however, than the other phases which are necessary to keep the modern warplane in prime condition. Perhaps this is because the work done on the motors is comprehensive only to those who know the working principles of the combustion engine and are not blind to its many parts and their operations. The average man is more interested in what is done to the fuselage and the wings.

Since the introduction of the all-metal airplane construction and covering, Uncle Sam has been busy working out a complete new system of over-haul. Naturally the sheet covering and metal framework requires a different type of repair than did the wooden frames and fabric covering. Streamline forms which supply "curves" for the modern fighter necessitate new technique for the man who has to straighten them out. The once quick fabric patch has become a complicated procedure of expert riveting.

The story of how this is done starts when something goes wrong in the air.

Not long ago one of the army's transport planes got "in trouble" over Dayton and while attempting to glide in for a landing at Wright Field mogged itself in a ditch, crumpling a wing and doing considerable damage to the fuselage. Since these ships cost thousands each of dollars, Uncle Sam tries in every way to salvage what he can.

Although reports are lacking, since the army keeps its crash stories confidential because important advancements sometimes are the result of certain knowledge which is brought to light by an airplane crashing, it is safe to assume that parts of this plane were sent to the repair base for replacement and reconstruction.

First job is the complete overhaul of the motors and replacement of damaged parts. Then the wings undergo new ribbing and framework to make them as strong as they were originally. Motor cowls and fuselage also have to be rebuilt. In some cases the cowls need only be straightened out, a procedure similar to the repair of an automobile fender. Then, with controls installed and new propellers the ship is ready for service again.

In machine shops where this work is done specially designed machines aid in forming the materials. Other machines turn out "new parts" which technicians have derived to make the job of reconstruction an easier one. Usually, however, only blue-print details precisely as in the original plane are followed.

One of the most interesting jobs of repair which exists today is that of applying the finish to the plane. This is also a new procedure. It seems that Uncle Sam has discovered something new and shiny for his warbirds in the form of Alclad covering.

Although this metal has been in use for almost a decade or more in the construction of airplanes and as a covering for airships, not until recent years has it been put to use as an outside skin for airplanes. For this purpose it has proved to be an ideal covering since it is a combination of pure aluminum and dural and naturally combines the advantages of each. In 1938 the air corps adopted the policy of covering all its planes with Alclad, thus doing away with the former blue fuselage and yellow wings which were positive identification for the military plane.

All of this came about when engineers learned that the pure aluminum, finish which is the outer skin of Alclad, was the ideal protective finish. The only problem now is that army planes are hard to spot from commercial ships since the giant airliners and other commercial planes also are covered with the natural aluminum finish.

It is the job of the men on the ground to keep this finish always looking its best. Thus, repaired jobs have to have polishing and re-polishing to make the sheets of covering correspond with the natural covering of the airplanes.

Special equipment has also made this repair business more complicated. Radio communication sets installed in the modern fighting plane has brought about a new system. Radio technicians now are employed to keep the army aircraft in shape. Intricate instruments have set up another branch of instrument repair. New control designs also have created problems.

There is no doubt that maintenance is a big job.

In addition to the plane itself there are certain necessary working supplies which also fall into this category. Gasoline and oil. Millions of gallons have to be stored and ready. New refueling apparatus has come into being. Special crews are necessary to care for this need in the large bombers.

Then comes another serious problem.

Ten thousand airplanes have to land. They must have air fields and hangars. Personnel must be supplied to keep these fields in readiness. No vacant lot will serve for an airfield. Specific localities are necessary. The ground must be just so, not too hilly, not too soft. The climate has to be favorable so that good wind conditions are always prevailing. The field has to be kept clear .

Who is going to do it?

That is what Uncle Sam must work out.

From somewhere, somehow will come mechanics, technicians, engineers, builders, men from all walks of life who will play an important role in the task of maintaining the air force America plans to build.

When the new warbirds come in flocks the America that has grown up with a generation of wings is going to keep "U.S. Air Supremacy."

The words of Mitchell were not in vain.

Building the Flying Stinson Junior

(Continued from page 29)

The fuselage is now ready for covering. Cover the section from the nose to the cabin with pieces of that length first and then the rest, which should prove very simple as it is of flat construction. Leave the last section on the bottom uncovered so that the rubber can be installed. Spray the entire fuselage lightly with water and when completely dry apply three coats of dope thinned out 50-50 with thinner.

Tail Surfaces

Although the method of constructing the tail surfaces may seem strange and unnecessary work it has been found that they are stronger and better aligned. Proceed by steaming a piece of 1/16" square soft balsa to the outline of the stabilizer. This can best be done by holding the strip of wood over the spout of a tea kettle and allowing the steam to soften the wood. Gradually bend it to the desired shape and then, while still moist, pin it to a board and allow to dry thoroughly. Then go ahead as though making a flat tail by cementing in place the spar and cross-braces. When set, remove it from the board and cement rectangular pieces 1/32" x 1/16" directly on top of the cross-braces and on each side of them. Wrap a piece of sandpaper around a block about four inches long and sand these rectangular pieces into a streamlined shape. Round the leading and trailing edges carefully with sandpaper and the unit is ready for covering.

Each side of the stabilizer can be covered in one piece which makes it fairly simple. Do not spray the tail surfaces with water, instead just give it several coats of dope thinned out to one part dope and one part thinner.

The rudder is built in exactly the same manner and note that a piece of 1/16" flat is shaped to the top curve of the stabilizer.

The stabilizer is now glued in position

Now an OHLSSON- -Built Motor FOR EVERY CLASS OF COMPETITION

Leader of the new complete line of Ohlsson motors for 1940 is the "60 Custom", *planned to be the finest miniature motor obtainable at any price.* Carburetor employs the famous VENTURI principle. Crankshaft operates in a friction-free long wearing Roller Bearing and against a Ball Bearing thrust. Bore 15/16, Stroke 7/8, Displacement .60 cu. in. *All three motors* in the new line are built around the proven engineering that made the Ohlsson 23 the outstanding competitive motor of 1939. A Piston and Cylinder that have been individually lapped, ground, and matched are a basic feature of EVERY Ohlsson motor. The "60 Custom" as well as other models can be run upright or inverted, and are easily converted. Price, complete with coil and condenser, **$21.50.**

For 1940, the "23" is basically the same as the famous 1939 model which won more contests than any other Class "B" motor during the year, although it competed against motors up to .30 cu. in. displacement! Now equipped with Ohlsson Jiffy-fill gas tank which eliminates filling delays in stress of competition. This is the motor that was submitted to the greatest test of endurance and engineering principles ever asked of a miniature motor—400 hrs. continuous operation. For Class "B" competition, it has no superior. Price, complete with coil and condenser, **$16.50.**

Introduced as the "surprise" motor of the year! The new Ohlsson 19 is identical in every respect to the "23" except that displacement has been reduced .031 cu. in. This means it is *built to the limit* for Class "A" competition—.199—and contains every feature of engineering and design of the National Class "B" Champion, Ohlsson 23. You are going to see plenty when you mount one of these new "19's" on your Class "A" ship. *Get one today* and start setting records for 1940. Complete with coil and condenser—*an exceptional value at* **$14.50.**

3 LEADERS BY THE MAKER OF CHAMPIONS!

OHLSSON and RICE

MANUFACTURING COMPANY

OHLSSON MINIATURES

at Leading Dealers and Distributors throughout the World

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and it is necessary to place a small block at the leading edge in order to keep the stabilizer at zero degrees incidence. The rudder is cemented and offset approximately two degrees to the right so as to make circles to the right. In cementing, most of the strength will be where the rudder meets the tail post, so use plenty of cement.

Wing

Cut a rib template out of stiff cardboard and cut fourteen ribs out of 1/32" sheet balsa. This can best be done by using two small straight pins to hold the pattern down and cutting around it with a razor blade broken into a point.

The wing is made in two sections and care should be exercised so as to make a right and left wing. Each end rib that is to meet the fuselage is angled so as to produce the proper dihedral when cemented to the fuselage. The best way to obtain this angle is to glue this rib into position last, so the wing can be raised from the board and blocked up to the proper dihedral. In this manner the rib can be glued perpendicular to the work board; checking with either a square piece of cardboard or a drawing triangle.

The top of the wing is covered first and it is necessary to use a separate piece of paper at the tip. Use covering cement on the two end ribs and the leading and trailing edges only so that any small wrinkles that may form can easily be removed during the doping process. Spray the wings lightly with water and give them several coats of dope, using the same mixture as on the tail surfaces.

Make four wing struts of 1/16" x 1/8" hard balsa stock. Sand these to an oval shape and cut the ends at a slight angle as shown on Plate IV. Two coats of clear dope are now applied and a fine grade of sandpaper should be used between coats.

Cement one section of the wing at a time to the fuselage and use the wing struts to hold it in position until dry. Be sure to cut the paper away at every point where the struts join the wing and fuselage to insure a good joint. The wing is placed at zero degrees incidence.

Detail

To make the cylinders, take a piece of soft balsa 1/2" square and sandpaper it round and slightly thicker through the center than the ends, as shown under Cylinder Detail. Two pieces of 1/16" x 1/8" are cemented at an angle to the top of the cylinder and shaped into a streamline with sandpaper. Start wrapping the cylinder with black thread at the top and proceed downward, spacing each wind about 1/32" apart. Keep coating the thread with dope so as to prevent it from slipping while wrapping. Give the cylinders several coats of clear dope and then a coat of black.

The seven cylinders are spaced evenly around the nose, placing them so that one is directly on top and two at the bottom, forming an inverted "V." The other two on each side are spaced equally apart in the remaining space. The push-rods are made of straight pins and are forced into the body and cylinders and cemented. Leave these natural colors so that they may stand out from the rest of the motor.

The tail wheel is mounted with .026 piano wire as a support. Bend one-half of this support; then insert the wheel and bend the other half. This is finally cemented to the fuselage right beneath the tail post.

The original model has a red fuselage with yellow wing and tail surfaces. The door outline, license numbers and minor details are black.

Propeller and Flying

The propeller is carved from a block 1-1/4" x 3/4" x 7-1/2", shaped into a blank as shown in Plate IV. This is done with a sharp pocket-knife and sandpaper; be sure to pierce the center hole before carving. After the blank is completed proceed as with any ordinary right-handed propeller, leaving the blades about 1/8" thick at the center and tapering to 1/16" at the tips. About 1/16" camber should prove sufficient and is worked in with sandpaper wrapped around a 1" diameter bottle. Shape the prop to the template and give it three coats of clear dope, balancing between each coat.

The free-wheeling device is made of 1/32" sheet brace and its construction is best explained by the drawing. Cement this solidly to the front of the propeller and also cement a piece of brass on the back of the prop where it meets the plug. Insert the prop shaft, bent of .045 music wire, through the plug; put on several washers, slip the prop on and finally bend the shaft as shown by the dotted lines.

This method is designed so as to allow the model to be wound with a winder from the front.

Six strands of 3/16" flat brown rubber proved very satisfactory for all-around flying and this should be well-lubricated and "broken-in."

If the preliminary gliding can be done indoors, so much the better; but if not, glide it over tall grass. The model may be slightly tail-heavy, and if so, a small piece of lead can be concealed just inside the nose. Once the model is made to glide perfectly make all further adjustments at the nose plug; adding or diminishing the negative and right thrust as may seem necessary.

Designing Gas Models For Performance

(Continued from page 21)

listed as 0.2 brake horsepower.

We may now list the three loadings for clearness. They are: $l_p = 33.7$; $l_t = 44.8$; $l_s = 0.108$.

Step 4 requires us to obtain the general loading factor, L, from fig. 3. This is done entirely without calculation. Spot off l_p on the left side of the graph as shown by point "A." Draw a vertical dotted line as shown to point "B," where it intersects the value of l_s on the curves. As can be seen, there is no curve for l_s equalling exactly 0.108, but this particular value as any other, can be very closely approximated by eye. From point "B" draw a horizontal line over to point "C" on the right side of the chart. Again, there is no curve for l_t equalling exactly 44.8 but the value may again be closely approximated. From "C" a line is drawn vertically down to "D," where the value of L is read off directly. At point "D" L is read as 5.3, which is close enough reading. From now on, the performance may be obtained easily.

Fig. 4 is a plot of l_t C_h against L. C_h is the rate of climb in feet per minute, and l_t is again the power loading. Reading the curve, when L equals 5.3, l_t C_h is 15,700. To get C_h, the maximum rate of climb, divide by l_t. $C_h = \frac{C_h\, l_t}{l_t} = \frac{15{,}700}{44.8}$ = 350 feet per min.

The maximum forward speed may be obtained from fig. 5, which is a plot of $\frac{V_m}{l_s\, l_t}$ against L. Looking at the chart as shown by the dotted line, when L = 5.3, $\frac{V_m}{l_s\, l_t} = 9.85$. To get V_m, the maximum forward speed, it is only necessary to multiply $\frac{V_m}{l_s\, l_t}$ by l_s and l_t. So we have,

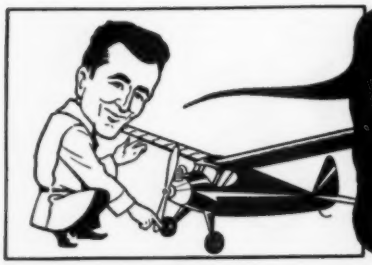
$V_m = \frac{V_m}{l_s\, l_t} \times l_s \times l_t = 9.85 \times 0.108 \times 44.8$,

or $V_m = 47.6$ miles per hour.

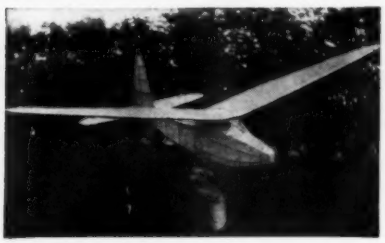
To some this value of nearly 48 miles per hour may seem high, but remember that this is the MAXIMUM forward speed and is obtainable only when the model is flying level, with zero rate of climb. Putting it another way, this is the condition wherein all the power in the engine is utilized to make the model go forward. The instant the model begins to climb, the forward speed drops, since part of the engine's horsepower is used in making the model climb. Experienced model builders will recall with a shudder what happens to models when they stop climbing: The forward speed shows a remarkable increase even if the model is banking. This value, V_m, or forward speed, has little significance in model design directly but we need it to get the speed of the model while climbing and gliding.

From fig. 5 we may obtain the value R_v which, if multiplied by V_m, gives the speed of the model while climbing at the maximum rate of 350 feet per minute. For L = 5.3, R_v is read directly as 0.55. Therefore, the velocity of the model at maximum rate of climb, or V_c, is obtained from the equation, $V_c = V_m \times R_v = 47.6 \times 0.55 = 26.2$ m.p.h. Now this figure of 26.2 miles per hour is more in accordance with our conception of the model's forward speed.

To most model builders this figure V_c will mean very little. It may be very interesting to know that the model will climb at a forward speed of such-and-such, so what? The answer to this is that V_c will help out a great deal in trimming the model. For instance, this model when flown may climb at 300 feet per minute instead of 350 as computed, meaning that the adjustment is not quite perfect. Knowing well enough that the model will climb that extra fifty feet per minute why not change the adjustment so as to get it? But which way should we change the adjustment? There are no instruments to measure the rate of climb of the model, hence we must rely upon our analysis to squeeze the last bit of performance out of the model.

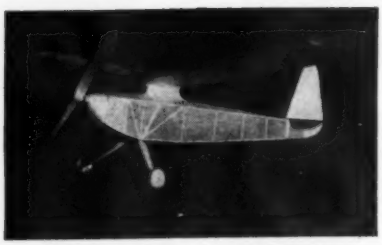


SAY FELLOWS:
LOOK FOR THE STARTLING ANNOUNCEMENT ON OUR SPECIAL ADVERTISEMENT IN THIS ISSUE. YOU'LL BE INTERESTED! *Barney*



THE ALBATROSS 45 in.

Towline soaring glider. Here is the large glider you have been asking for. Kit is complete. **Add 10c for postage** **50c**



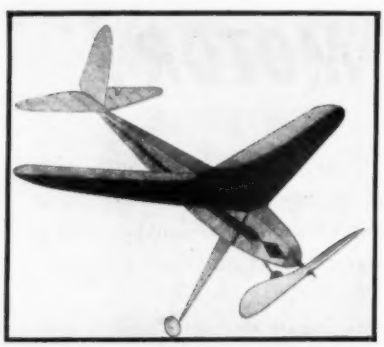
SUPER HIGH WING 30 in.

A companion model to the Pacific Ace. Just as sweet a flying ship. Kit is complete. **Add 10c for postage** **25c**

THE CHAMP

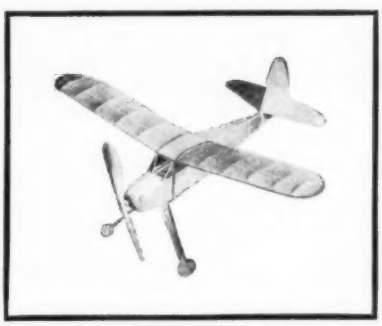
Wing Area 191 sq. in.

The name Champ tells the story. It will outfly any model in its class. The kit is complete, nothing else necessary to build and fly the model. Includes free wheeling unit, plenty of rubber, rubber lub and the best balsa you've ever seen. Add 10c for postage **$1.00**



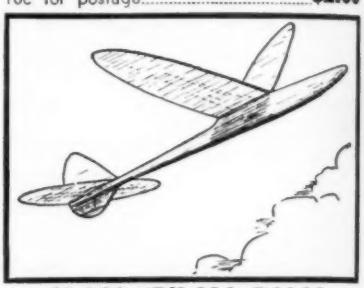
RECORD WRECKER

Newest Modelcraft Sensation! With a 26" span the Record Wrecker includes freewheeling unit, rubber tube, contest rubber, best quality balsa, cement, dope and large full size plans. **Add 10c for postage** **50c**



30 in. PACIFIC ACE

A practical and durable commercial model. Easily constructed from well drawn and detailed plans. Kit contains an ample supply of first grade wood and high quality cement. Comparable with and outflies most dollar kits. **Add 10c for Postage** **25c**

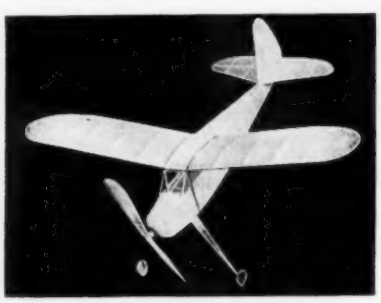


CLASS "B" ALL-BALSA GLIDER

Class "B" all-balsa Glider is easy to build and a honey to fly. Add 10c postage **25c**

FLIGHT TIMER

Adjustable from 1 second to 5 minutes. Weight 5/8 oz. The first dependable timer made just for models..... $1.25



CLOUD HAUNTER

40 in. model, same ship as Pacific Ace, add 10c postage **50c**

W. R. Butterfield of Los Angeles made a flight of 2 hours and 40 min. with his Cloud Haunter.

MODELCRAFT SOARING GLIDER

(Towline Glider)

31½" Soaring Glider has turned in many flights of better than one hour. Kit complete. **Add 10c Postage** **25c**

WRITE FOR OUR
NEW 1940
MODELCRAFT CATALOG
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"IT'S FREE!"

★ **MODELCRAFT** ★
THE LEADING SUPPLY HOUSE OF THE WEST ★ 7306 SOUTH VERMONT AVENUE, LOS ANGELES, CALIF.

The author has taken part in a good many contests, both as contestant and official, and it has been his personal experience that practically every model except those near the top were decidedly out of adjustment. In the next article, the charts for obtaining sinking speed, gliding angle and their corresponding forward velocities will be given. The subject of adjustment will be begun with special emphasis on wing setting. One important subject that will be discussed is wing incidence. Why does it exist? EXACTLY how much should be used? Also discussed will be this business of "down-thrust."

Here is the performance up to this point:

Maximum speed.....47.6 miles per hour
Maximum rate of climb, 350 ft. per minute
Speed for max. climb, 26.2 miles per hour

How To Build The Airmobile

(Continued from page 9)

to save time . . . time which might be used for additional warm-up runs.

And now that we have discussed the advantages of this novel little racer, let's start construction for undoubtedly there'll be a race round your way that you'll want to enter soon.

Construction of the auto begins with the chassis. The longitudinal members of the chassis are made of 1/2" aluminum angle mount. First, using a 1/8" drill, holes are drilled as indicated in the plans, on the top of the angle mounts. The sides are drilled with 3/32" holes which will correspond with the holes to be drilled later on the body template. Referring to the perspective sketch, attach into place the axle plates and the front and rear end braces. The former are made of 1/16" cold rolled steel while the latter are made of 1/8" aluminum. Bolt the plates into position with 3/8"-8-32 bolts. Place lock washers between the nuts and the chassis frame. Tighten nuts. Note that a tin plate is bolted to the forward end of the frame and that the aluminum motor mounts are attached in a similar manner to the rear end.

The motor mounts are of 1/2" aluminum angle mount. Refer to the side and top views for the shape of the motor mounts. Note that the joints of the mount are welded at the points where bending occurs. The welding may be done at any garage for a few cents.

Cut the axle springs of 1/16" cold rolled steel to correspond to the plans and bend as indicated. The axles are made of 1/4" steel rod, 10-1/2" long. The length of the axle may vary slightly depending upon the width of the wheels used. The ends are threaded so that a clearance of 1/32" is allowed for tightening the nut to hold the wheel into place. The axles are slipped through the end holes of the axle springs and are soldered or welded into place.

The forward axle assembly includes radius rods of 1/8" steel.

The coil is now mounted into position as shown in the perspective. Fiber strips are used to hold it into place. Under no circumstance use metal for this operation as a short circuit will result.

Using .025 sheet tin, purchased at any hardware store, cut the body and cab templates as shown in the diagrams. Make certain that sheet tin is used for this job . . . do not accept galvanized tin as a substitute as it is too heavy.

Bend the templates over a small baseball bat or other tapered piece of wood curved similarly to a bat. File all the edges smooth and finish with metal cutting sandpaper.

Before attempting to attach the body to the chassis, build a wooden battery box, similar to those used on gas models, and attach as shown in the side view. Wire the auto according to the wiring plan and solder all connections securely.

Line-up the chassis, tighten all bolts and solder the nuts permanently. Do not solder the nuts holding the axle assembly to the chassis, as these must be left free so that adjustments can be made.

Slip the body onto the chassis, bolt it to the longitudinal members and solder. A stiffener former "B-B" is bent, as shown in the perspective, and forced into place from the bottom of the car. Tension will hold the former into place, therefore it need not be bolted. Soldering it to the body will suffice. Also note that it need not be in the exact position indicated in the drawings. Solder the cab onto the body using a very hot iron for the operation. This will tend to sweat the solder through the joint to the other side and make a better joint. Using a fine file, smooth the solder so that the joint is almost invisible.

A square piece of wire mesh is bent as indicated and soldered in place simulating the radiator.

Bend former "A-A" as illustrated and force it into position at the bottom of the chassis.

Note that the bottom of the car is covered with a tin pan. The pan is cut to size, drilled so as to accommodate a switch and soldered to the body.

Before soldering the pan into place, attach bridle eyes to the auto as indicated in the top view.

A left handed propeller is carved from a maple block, 7/16" x 1-1/4" x 9-1/4", and is sanded to a smooth finish. Several coats of paint should be applied.

After bolting the engine temporarily into place, bend a hatch of sheet tine and solder to the cab with a small brass hinge. No pattern has been indicated for the hatch as it will vary slightly with the engine used.

Body Finish

After the auto has been assembled and all the soldering completed, apply several coats of auto primer. Allow about two hours between coats and sand with fine, damp, sandpaper after each coat has dried.

It has been found advisable to spray the car with lacquer; however, if a spray job cannot be managed painting it with a brush will have to suffice. Several coats of the lacquer chosen will undoubtedly be necessary in order to insure a mirror-like finish. The color selection, naturally, will rest with the builder.

Running the Car

To run the car, it is advisable to abide by the methods set up in racing. That is . . . always run the car in a circle. A strong thong is attached to the bridle eyes at the side of the body by means of clips. One end of the thong is attached to a post, well

DENNYMITE WINS!

1st, 2nd and 3rd PLACE!

In the So. California Gas Model Association Midwinter Model Airplane Contest . . .

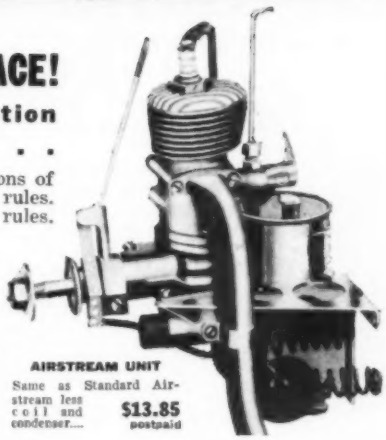
This annual contest, unlike other meets in other sections of the United States, is held under 12 oz. wing loading rules. These rules are even more severe than the new N. A. A. rules.

Under These Adverse Conditions this sweeping victory again proves that Dennymite has more power and speed for its displacement than any other motor at any price. Under the new N. A. A. rules, ships are heavier, more power is required. Will your present motor compete with these conditions? **See your dealer today—ask him to start a Dennymite—you will be convinced.**

SPECIFICATIONS— Displacement .57 cubic inch—bore 9/10—stroke 9/10—two cycle ¼ **horsepower at 6500 r.p.m.** Height overall including spark plug 4½ inches. Length overall 5".

DE LUXE AIRSTREAM
Complete with coil, condenser, Dural motor mounts, De Luxe long exhaust and exclusive spring choke..... **$17.85** postpaid

STD. AIRSTREAM
Complete with coil, condenser and short exhaust stack **$15.85** post paid



AIRSTREAM UNIT
Same as Standard Airstream less coil and condenser.... **$13.85** postpaid

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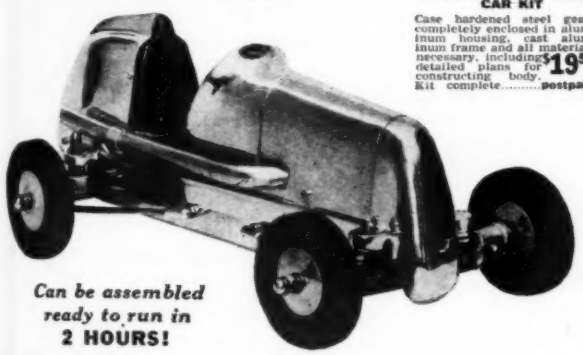
The New

"DE LUXE" MERCURY MIDGET RACER



Can be assembled ready to run in **2 HOURS!**

NEW "DE LUXE" MERCURY MIDGET
Rear wheel drive—All metal body complete, prefabricated, machined and polished, ready to assemble—Drive unit gears run in oil in totally enclosed housing. Kit (less flywheel and motor) **$23.50** postpaid

ORIGINAL FRONT DRIVE CAR KIT
Case hardened steel gears completely enclosed in aluminum housing, cast aluminum frame and all materials necessary, including detailed plans for constructing body. Kit complete..... **$19.50** postpaid

"DE LUXE" MERCURY MIDGET RACER

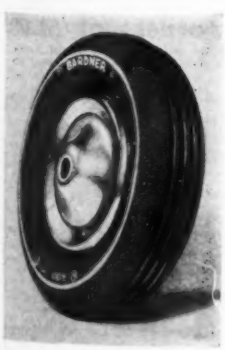
POWERED BY DENNYMITE

This winning combination has won more 1st places than all other racing cars combined, including world's speed record of 62.23 miles per hour.

EXCLUSIVE FEATURES OF "DE LUXE" MERCURY

Rear wheel drive—Cast aluminum frame, machined and polished, with X member for rigidity—Chassis mounted on 4-coil springs with rubber snubbers—*All metal body complete, pre-fabricated, machined and polished ready to assemble.* Four heavy duty radius rods, ball and socket type I-beam front axle.—Drive unit includes case-hardened steel gears running in oil and completely enclosed in aluminum housing.—Car furnished completely machined and ready for assembly (less flywheel and engine).—Car is perfect scale model of most modern midget race cars.

The Original **MERCURY MIDGET**



GARDNER RACING WHEELS

With the Gardner racing wheel two sizes, 6.00 x 17—approximately 3⅝" and 6.75 x 17—approximately 4", a scale effect is obtained, as nearly all midget racing cars use larger wheels on the rear. For a higher gear ratio 4" wheels on the drivers will give greater speed. Polished chrome plated wheels, bronze bearings for standard ¼" axle, racing type rib tread, finest tread rubber obtainable. Tires are locked to wheels.

6.00 x 17.....**$1.10 each**
6.75 x 17.....**$1.25 each**

DENNY ACCESSORIES
FOR RACING CARS

Flywheels, 8 oz.	$1.00
Special Flywheel, 16 oz.	$1.50
General Batteries, ideal for racing cars—3 sizes	25c—50c—75c
Aluminum Exhaust Pipes	$1.25
Special Exhaust Pipes for ported motors	85c
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Steering Wheels	65c

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REGINALD DENNY INDUSTRIES, INC.

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weighted down to guard against tipping over. At the opposite end of the thong the bridle clips are fastened securely and to these the car is attached. By changing the length of the thong the circumference of the circle around which the car is raced may be regulated. Make certain that the thong clears the wheels of the car and that it does not get tangled up in the propeller. Also make certain that you do not attempt to stop the car until the motor has cut-off and the momentum has been reduced by several additional laps of coasting.

For those who are mathematically inclined, may we state that the car will weigh about five pounds and will travel at about 40 miles per hour. Thus one can understand why it is advised to allow the car to coast several laps after the motor has stopped.

Needless to stay, just like a real racer, the model should be well oiled and kept in trim if maximum efficiency is to be expected.

Bill of Materials

2 sheets of 025 tin 12" by 18" for body pattern, etc.
4 feet of 1/2" aluminum angle mount for chassis, etc.
4 feet of cold rolled steel 1/2" by 1/16" for axle springs, etc.
1 foot of cold rolled steel 1" by 1/16" for axle plates
1 foot of aluminum 1/2" by 1/8" for braces
2 feet of 1/4" steel rod for axles
2 feet of 1/8" steel rod for radius rods
1 foot of fibre for coil mount
1 box of 3/8"-8-32 nuts and bolts
2 dozen bolts 1/4"-4-45 for mounting body to chassis
1 bolt 3/8"-6-32 for mounting front axle
6 square inches of wire mesh for radiator
5 feet of auto light wire for ignition system
2 pairs of 3-3/4" rubber tire wheels with bronze bearings
switch
Wood for battery box
Solder, primer, and lacquer
Maple propeller block 7/16" by 1-1/4" by 9-1/4"

The K.G. Lives Again

(Continued from page 15)

Install the motor mount retainers formed of bicycle spokes, and reenforce the space between F-2 and 3 with a spreader of 1/4" sheet. (See motor mount retainer detail, Plate V.)

Continue planking the fuselage with 1/8" x 3/8" soft balsa strips. Fit each plank at the rear of the fuselage by holding it in place and marking accurately before cutting the taper. (See fitting planks, Plate V.) Bevel one edge slightly with coarse sandpaper to take care of the sharp curve of the bottom of the bulkheads. Use plenty of cement and pin each plank tightly against its neighbor and there will be no apparent seams after the body has been sanded. Trim any overhanging planks flush with the face of F-2 and cement F-1 of 1/16" plywood in position.

Using a very sharp knife, carve the "squareness" and the cement skins from the surface. Hold the blade at a shallow angle and take only long thin "peelings." Then smooth the surface with coarse

sandpaper and gradually use finer grades, finishing with 6-nought and polishing with 10-nought. Apply about four coats of clear dope, sanding with 10-nought between each. A good finishing method is to cover the fuselage with bands of tissue about 4" wide, applied with the grain running around the body. Sand and dope as before.

Cut an opening in the fuselage and mount the flight timer. The one illustrated was converted from an autoknips camera timer. The heavy case has been removed and a sheet of .010 brass substituted. Be sure it fits snugly at the bottom or the moving arm may disengage from the driving gear. However any other type timer may be installed with a little ingenuity and will work quite as well. Run two leads to a pair of "jacks" made from large face brass bushings mounted in F-1. (See timer conversion, Plate VIII.)

Cement the tail post B to the rear of the fuselage, so that the tail rest A will give the stabilizer negative incidence of 1/4" as compared to the top of the wing mount. These parts are the same as the tail base given on Plate IV last month. Cut the fin outline from 3/16" sheet and attach a small tail wheel by an .040 wire fork. Brace the tail base with short 1/8" x 3/8" uprights to prevent sagging when covered. Cement a narrow beading of 1/16" square to the fuselage, to set the edges of the tail base, fin and pylon fillets.

Now to cover the pylon with silk. This is a new trick that produces a beautiful job. First cut a section of silk of ample size and wet it thoroughly. (A) Immediately lay it in place, spreading it roughly into position. You will find the wet material sticks to the frame. (B) Now apply heavy dope over the silk in the area between F-3 and 4. Pull it vertically taut using pins to hold it if necessary. (C) Then draw in each end, pulling length wise, doping and pinning the silk in place in a similar manner. When the water has evaporated apply two or three more coats of dope to prevent the silk from springing loose when the pins are removed and the surface doped. While doing this run a razor blade over the silk at the bottom, along the beading strip and refinish the planking with several coats of dope, sanding between each. The tail fairings are done in similar manner. Try to pull the silk as evenly as possible on each side to assure a symmetrical cross section. However if one side does have less "hollow" than the other, a band of extra coats of dope brushed on lengthwise will increase the curve. Avoid doping the silk to any of the pylon struts or formers, or the smoothness of the fillet will be spoiled. Do not be disturbed by small wrinkles as silk absorbs them amazingly when doped, and even jagged tears can be repaired by merely laying on a patch and doping several times. (See step III, fuselage assembly details, Plate V.)

Motor Unit

Cut the motor bulkhead, shown full size on Plate VII, from 1/8" plywood. Cement and brad a plug of 3/8" x 5/8" bass, which fits snugly into F-1, to the bulkhead. Glue the battery trough of 1/16" hard sheet balsa into the Vee-shaped notch in the center of the plug. A square of 1/8" sheet reenforces the joint. Short lengths of 1/16" sheet form a box in which the coil is housed. Use several coats of cement on all joints.

Trace the full size motor mount pattern onto 3/64" sheet aluminum and cut out with a jeweler's saw or tin snips. Clamp the blanks together in a vise and file them to exact shape. Bend the blanks to shape over a hardwood block, by tapping with a mallet, or a block of hardwood and a hammer. Be sure to make one left and one right. Drill all the holes with the exception of those for the motor. Cut three blanks of .020 sheet aluminum and bend fittings Z around 1/8" diameter wire. Form the landing gear of 1/8" diameter piano wire, measuring each bend

to assure symmetry.

Slide the motor mounts and the fittings on the landing gear. Attach them to the bulkhead with 3/32" bolts. The top landing gear fitting bolt also holds a 3/8" wide brace strip of .020 sheet aluminum. This is bent down and glued to the bottom sides of the battery trough.

The battery box is a 1/16" sheet trough with ends of 1/8" sheet cemented solidly in place. Terminals of .020 sheet brass are fitted, one of which is formed into a spring to insure good contact. A pair of 2-1/2" wheels are retained on the axles by washers soldered on both sides.

Slip the motor unit into the fuselage and clamp it in place by tightening down a pair of bicycle spoke nipples on the protruding bicycle spokes. An inverted Brown motor was used in the original but any other engine can be accommodated by drilling the mounting holes to suit the crankcase. Drill one hole and bolt the engine in place, checking carefully to make certain the thrust line is not offset. Then drill the remaining holes and complete mounting the motor.

Remove the motor unit and install the wiring. The ignition hook up recommended on Plate VIII will operate on the boosters while the timer switch is open, helping to conserve the small batteries.

Cowling

The cowl is planked on two formers, G-1 and 2, connected by four 3/16" square spacers. Add the nose piece of 1/2" balsa and round smoothly. Cut the cowl near the top and hinge the two parts. A small rubber band at the rear snaps the top shut after the engine has been adjusted. A pair of .028 piano wire clips attach the cowling to the motor mounts. (See Plate VIII.)

Before operating the engine apply a coat of spar varnish to the fuselage, cowl and motor unit to oil proof the structure.

Flying The K-G-S

Attach the tail unit with small rubber bands and slip the motor unit in place. Balance the model by sliding the batteries till the center of gravity is established 5" from the front of the pylon. Mount the wing with about six or eight strands of 1/4" rubber and proceed to get the "feel" of the ship by gliding it from low altitudes into tall grass or weeds if possible. Then find a more open area and make numerous glides to discover any circling tendency. Adjust the rudder to produce an almost straight glide, with possibly a slight curve to the right to avoid a long chase after the engine cuts.

When satisfied start the engine and get it running smoothly at about half speed. Set the timer for ten seconds. With such a short motor run it will be best to hand-launch the ship if no smooth take-off spot is available. Even under this power the K-G-S will climb swiftly and demonstrate its glide. Of course finer adjustments will be needed. The only way to find them is to fly the ship as often as possible. Adjust the model to make circles of about 150 to 200 feet while gliding by bending

the rudder; increasing the negative incidence of the stabilizer if the glide seems a bit steep. Under power the best climb, without a dip at the top as the engine cuts, is obtained by right circles slightly larger than those of the glide. The power flight can be easily adjusted by placing thin wedges between the motor bulkhead and the fuselage face to offset the thrust line.

Though your ship may lead you a merry chase under even half-power, you can be sure of it when you give the timer the full run of twenty seconds and open the engine wide. The K-G has come back,—"and how!"

A list of various engines which may be used, with their displacement, the minimum possible or required weight of the model and the wing loading in ounces per square foot which will result, is shown in the column at the right.

Engine	*Displacement*	*Minimum Possible or Required Weight*	*Wing Loading in Oz. per Sq. Ft.*
*Ohlsson 23	.213	16.98 oz.	8
*Hi-Speed Torpedo	.304	24.32 oz.	8

The next 5 engines give the best results in Class C

Baby Cyclone	0.363	29 oz.	8
Mighty Midget	0.45	36 oz.	8.6
Gwin-Aero	0.45	36 oz.	8.6
Hurleman Aristocrat	0.46	35.8 oz.	9.1
Sky Chief	0.526	42 oz.	10
Dennymite	0.563	45 oz.	11
Brown	0.6	48 oz.	11.3
O. K.	0.616	49.3 oz.	11.3

*Using these engines, the K-G-S is eligible for Class B competition. With others it is eligible for Class C.

If the larger engines are to be used the required minimum weight can be made up easily by using large batteries and harder wood than specified in the plans.

With the limitation of available power, aerodynamic efficiency and stability have greater bearing on the minimum performance of a gas model. The K-G-S has these desirable qualities in full measure when equipped with any of the engines illustrated above, or those of equivalent displacement.

Frontiers of Aviation

(Continued from page 13)

across Germany to Berlin and other distant vital German points. The four-engined bomber with greater fuel and better accommodations for the crew will be more suitable. A tricycle landing gear is also likely. The new Pratt & Whitney Double Wasp will supply the power and the super speed.

As a conjecture to Curtiss's new high-wing observation plane (203 on order states "American Aviation") we will see a small two-place ship powered by a Pratt & Whitney R-1340-51 engine with wheels that retract up into the side of the fuselage. A single long strut extends to the mid-point of each outer wing panel with a few short struts at the center section holding the wing a few feet above the fuselage. The crew sits aft of the wing, tandem, and in a glass enclosure. The wing is gulled.

Curtiss is still working on its line of small trainer and interceptor-fighter series and is exporting several. The CW-21 will be remembered as the little single-seater interceptor produced last year and then came the two-place CW-22 along the same general lines. The CW-22 has taken on the famous name of "Falcon" that was synonymous with the name of Curtiss years ago. The CW-23 is the latest and will be used for basic combat work. Seating two in tandem style in a cabin, the airplane has a retractable landing gear that is flush with the wing center section. It is powered by one of Pratt & Whitney's smaller engines . . . a single row Wasp.

Like Vought-Sikorsky, Curtiss has now test flown a new Ranger powered observation-scout, the XSO3C-1. It is a mid-wing, two-place airplane equipped with a single main float and two wing tip floats. The float attachment is interesting in that it is a full cantilever structure offering excellent streamlining. The airplane as a whole is far different from anything built in the past. Powered by a Ranger V-12 inverted air-cooled engine the ship is of light construction and will be used more or less as a trainer with "the Fleet." Taking the place of the Vought Corsairs it will be operated from catapults on the navy's battleships. The fast little ship is now to undergo tests at Anacostia. Curtiss-Wright has recently gained about $30,000,000 in new orders for planes and engines to be exported to the Allies.

Do not be surprised to see Martin's new medium-bomber for the air corps appear with powerplants equipped with extension shafts for the propellers. The radial engines

are predicted to be completely enclosed to conform with the very sleek lines of the rest of the airplane. The installation will be Pratt & Whitney.

The new Republic (formerly Seversky) interceptor-pursuit in the air corps latest competition is similar in general appearance to past Severskys, except that it will be a literal powerhouse, toting a 2800 cu. in. displacement engine in the nose. No doubt the airplane will be very fast, but it is difficult to conceive a Pratt & Whitney Double Row engine of that size being twirled about in combat maneuvers. However the job of the interceptor is to climb into the air as quickly as possible and meet the enemy; and a good powerful engine would come in useful in that instant.

Bell's new pursuits, of which about 80 are being built, will have Allison powerplants of an improved V-12 type. "Newsweek" states that Douglas is completing their B-19 bomber. The proposed six-engined giant of 250 foot wingspread is now said to have dwindled to a 212 foot span airplane powered with four double-row engines . . . which still makes it a big airplane! Dougles is putting it together in their large assembly hangar and it may be a matter of a few months before the airplane takes the air.

The St. Louis Car and Foundry Company's new PT-15 trainer, ordered by the U. S. Army Air Corps, is our idea of an excellent all-round training airplane. It is a little ship powered by a Wright Whirlwind seating two people in open cockpits in a metal fuselage. It is a biplane and very much resembles Stearman's trainers, even to the full-cantilever landing gear.

Vultee's new super-pursuit plane has been named the "Skycat" by Vultee, and the basic combat ship, which incidentally cracked up recently during a test hop, is known as the "Valiant." Gil Clark, recently returned from Brazil, was only slightly injured in the mishap while putting the plane through tests prior to delivery to the Air Corps.

Here's some powerplants that will be used in new Air Corps equipment: Boeing B-17C, Wright R-1830-65 (1,000 hp.) . . . North American B-25, Wright R2600-9 (1,500 hp.) . . . Stinson 0-49, Lycoming R-680-9 (280 hp.) . . . Stearman PT-13B, Lycoming R-680-11 (220 hp.) . . . Pratt & Whitney are building 450 hp. engines for North American and Vultee basic trainers and 500 hp. engines for North American AT-1 advanced trainers, 1,000 hp. engines for the Consolidated B-24 bombers and 1380 hp. engines for Martin's B-26 bombers . . . also 425 hp. engines for Ryan observation planes and 450 hp. engines for the twin-engined Beech ships for the army.

On the private plane front there is much activity with Piper coming out with a tapered wing airplane, single-strut braced, that may be destined to give Stinson's "105" some competition. They are also said to be thinking about the light amphibian market, which is real news. It shows that the Piper company is always looking towards the future and illustrates that competition among the light plane manufacturers makes for finer airplanes. Spencer-Larsen is making another stab at their Menasco-powered light amphibian to try and get it on the

market. Spartan has produced another training biplane which looks like just another airplane, but it served its purpose well in educating the Spartan School students who built the ship. TWA has now definitely purchased five Boeing 307 four-engined transports and United has ten DC-4 Douglasses on order. The United DC-4s are said to be slightly smaller than the prototype, but faster.

Recent flight tests of a new type of airplane in the vicinity of Buffalo, N.Y., were explained today with the announcement by the Curtiss-Wright Corporation of its Curtiss Aeroplane Division's (of Buffalo, N.Y.) development of a new experimental airplane for the U.S. Navy.

The new plane is identified by Burdette S. Wright, Vice President of the Curtiss Aeroplane Division, as the Curtiss XSO3C-1, and described as a mid-wing monoplane, powered with a 12-cylinder, Ranger inverted "V" type of air-cooled engine, developed for operation off the battleships and cruisers of the U. S. Fleet. It carries a crew of two and may be interchangeably equipped either as a land plane or as a seaplane.

Primary flight tests by Chief Test Pilot H. Lloyd Child of the Curtiss organization, Mr. Wright said, indicate that it is unusually fast for a scout-observation type and has an extended cruising radius which gives it added value in accomplishing missions as "the eyes of the fleet." All details concerning its construction and performance are withheld.

After the completion of current factory tests, the Curtiss XSO3C-1 will be flown to the U. S. Naval Air Station at Anacostia, D.C., where it will undergo acceptance trials by Navy test pilots. It marks the latest of a number of observation types of aircraft developed for many years by the Curtiss-Wright Corporation for the Navy. Curtiss SOC planes already are in use aboard all U. S. Navy battleships and cruisers.

N.A.A.

(Continued from page 26)

or record trials shall be conducted by an officially appointed N A A Contest Director who may name as many assistants as are necessary.

DESIGN OF MODELS—There are no restrictions on the design of the models except that they shall meet the specifications named in the definitions and classifications. However, the models must be so designed that they drop no parts in flight, *or during takeoff.*

NUMBER OF MODELS—Each contestant will be allowed a maximum of three models in each event, and he may use any or all to complete his flights.

NUMBER OF FLIGHTS—Except in the case of gliders, each contestant will be allowed a total of three official flights. A flight is a start that lasts 20 seconds or longer in an outdoor contest, with the exception of gas models. For indoor models a flight is a start that lasts 60 seconds or longer. Any flight less than that or failure to fly promptly when called shall be judged a delayed flight. *Pushing or guiding a model shall also constitute a delayed flight, except in the case of gas models when R.O.G. rule has been waived (see Internal Combustion Powered Models).* Three successive delayed flights shall be considered as displacing one official flight. In determining what constitutes an official or a delayed flight, the official time will count and a model must remain in flight without being touched after it is officially released, unless it is apparent that it is out of control or about to strike the ground. If not declared to the timers at the time of the collision, such a flight is to be judged as an official flight. Should subsequent official flights fail to surpass the duration of a delayed flight that has been declared, the contestant shall be entitled to reinstatement of the delayed flight as official. *Scoring time for indoor models shall be the longest of three official flights; except in the case of indoor gliders, where scoring time shall be the longest of nine official flights. Scoring time for outdoor models shall be the average elapsed time of three official flights; except in the case of outdoor hand-launched gliders, where scoring time shall be the average elapsed time of the three longest of nine official flights.*

In computing average time in seconds, the second numeral to the right of the decimal shall be dropped; results shall be carried to the nearest mathematical tenth.

A contestant also makes a delayed flight *INDOORS* when his model meets an obstruction that prevents further flight. Should a contestant not make one complete official flight in his nine possible chances, his best delayed flight, *or the average of his three best delayed*, shall be recorded as his best time. Actual flight time shall be credited for a flight which ends by obstruction, no allowance being added for such mishap. In the power event, a flight of less than 40 seconds total elapsed time, or an engine run of over 20 seconds, is considered a delayed flight.

NUMBER OF FLIGHTS—GLIDERS—In the case of *hand-launched* gliders, each contestant will be allowed a total of nine *official* flights. In view of this flight allowance, delayed flights for gliders will not be recognized or allowed.

TIME OF FLIGHTS—Flight time starts the instant a model is in flight and ends when the model first touches the ground or floor after being launched, or meets an obstruction that prevents further flight. Time also ends when a model passes from the timers' sight, but the timers shall make an effort to keep the model in sight until it lands. If a model meets an obstruction and falls free independently and resumes flight within ten seconds, time shall continue uninterrupted. Timers at an outdoor meet will remain on the field within a prescribed circle not to exceed 200 feet in radius, and timers will keep models in sight only by use of normal vision (colored glasses or sun shades permitted).

INTERNAL COMBUSTION POWERED MODELS—Any model using internal combustion power is limited to a total weight without fuel of seven pounds, a wing loading of not less than 8 ounces per square foot of wing area, *and must weigh at least 80 ounces for every cubic inch of motor(s) displacement.* It must be of the fuselage type and must meet the cross-section rule. Motor run must be limited by a timer or by fuel measurement to not more than 20 seconds for contest work. Only seniors and open class contestants holding N A A Gas Model Division licenses may compete in power model contests. Those under 16 may fly upon the signing of the pledge, and with the approval and supervision of an N A A Contest Director or a licensed gas model member appointed by him. No powered model may be flown, except with the approval of a Contest Director, when the engine run is longer than 30 seconds. When not flying in competition, 30-second motor run is permitted. *Gas models must R.O.G. UNASSISTED. except where conditions prevent. In such instances, Contest Director(s) may permit hand-launching of gas models, with the understanding that such flights will not be eligible for record purposes.*

INTERNAL COMBUSTION POWERED MODEL CLASSIFICATIONS—The internal combustion power model classifications are as follows:

Class A—Models using engines having up to and including .20 cubic inch displacement.

Class B—Models using engines of more than .20 cubic inch displacement, up to and including .30 cubic inch displacement.

Class C—Models using engines of more than .30 cubic inch displacement, up to and including 1.25 cubic inch displacement.

Combined Class—Models using engines up to

and including 1.25 cubic inch displacement (and meeting all other specifications for internal combustion powered model classifications). This event is for small, local meets where scarcity of entries or prizes would make it inadvisable to conduct separate gas events with separate awards.

The N A A will recognize national gas model records made only in Class A, B, or C. A record performance established in Combined Class will be accepted in which ever of the three classes it fits providing it exceeds that class record by at least 2%.

Any flight under forty seconds elapsed time and over twenty seconds engine run will be considered a delayed flight. Final time recorded will be the average of three official flights allowed.

NEW NATIONAL RECORDS—To receive official recognition, new performances in all classifications must exceed previous records by at least 2%.

BUILDER OF MODEL—Each contestant shall assemble all lifting surfaces and fuselage. The design may be obtained from any source. Only the builder may fly the model for records. Models built from kits are acceptable.

TERRAIN—The terrain for outdoor meets shall not vary as to difference of level more than standard practice for landing areas of airports. *Smooth take-off facilities are to be provided by the Contest Director(s). Horizontal raised runways are permitted providing they are not more than six (6) inches off the ground.*

DISQUALIFICATIONS—Any contestant who breaks any rule of a contest, or conducts himself contrary to the ordinary requirements of common courtesy, may upon recommendation of the officials be disqualified. Models broken in landing are not disqualified.

EXCLUSION—A sentence of exclusion may be pronounced by the local Contest Committee against any entrant from any event or from all events in the meet in case he is found ineligible to take part in the events, or is considered guilty of misbehavior or unfair practice. The local Contest Committee may order the removal from the flying field or building of any entrant who refuses to obey the order of a responsible official.

PROTEST—Protest will be considered only when presented in writing to the local Contest Director within one hour after the close of the Contest. The protestant must indicate the action or decision, the name of contestants and officials involved, and complete details.

APPEAL—Appeal may be made to the N A A Contest Board on action taken on protest. As in the case of protests, appeals made to the N A A must be made in writing within a three-day period following the action of the meet Contest Committee on the original protest.

LOSS OF AWARD—Any competitor who may be excluded or suspended in any event shall thereby forfeit all right to award in that event.

EMERGENCY RULES—The Contest Director and the Field Judge may with the approval of at least half of the Contest Officials establish emergency rules if necessary, providing said rules are not in direct violation of the Official N A A Contest Rules and Regulations.

Air Ways

(Continued from page 34)

Model Club of the Air

A very interesting and enlightening radio program recently has been started by Mutual Broadcasting System's Station WOR. It is called the "Model Airplane Club of the Air," heard every Saturday morning and is directed by John B. Gambling and Stan Coe. Possibly some of our readers have listened to it. If not we suggest you do not fail to do so. It is being carried on in order to give interesting information concerning the designing and building of models.

Recently it added another feature which will be extremely helpful. This is a "Radio Facsimile." In effect it is a little newspaper, transmitted by radio. Those who have facsimile machines can wake up in the morning and read the information which has been printed by the machine during the night.

Picture No. 7 shows Mr. Poppele, at the left, and Stan Coe, reading the print of the first transmission, over such a machine, of an aeronautical educational talk; made by Charles H. Grant, editor of MODEL AIRPLANE NEWS. Mr. Coe says of this new feature:

"Radio facsimile—the transmission of reading matter and pictures of the kilocycles, is being successfully demonstrated by WOR engineers early each morning in special facsimile tests over the station's regular broadcast channel.

"It is significant as a preview of what may well become a household commonplace within the next few years. The new process, which has been in the research laboratory during the past decade, allows printed matter and pictures to be flashed over wires or through the air for almost identical reproduction at the receiving point.

"The tests, acclaimed highly successful

by the engineers, are conducted from 2 to 3 a.m., when WOR has completed its regular day's program of broadcasting activities.

"The first broadcast conducted on February 10, was directed primarily at a special facsimile receiver located in L. Bamberger's department store in Newark, where the finished product remained on display during the month-long New Jersey State Exposition.

An exact reproduction of a section of the newspaper of the facsimile of the WOR Model Airplane Club follows:

VOL. 2 NO. 146
WEDNESDAY, NOVEMBER 29, 1939
TIME 2:05 A.M. E.S.T.

WOR-Facsimile Model Airplane Club

BY JOHN B. GAMBLING AND STAN COE

Perhaps in presenting this first transmission of the Model Airplane Club over WOR-Facsimile, it would be well to have Mr. Charles Hampson Grant, Editor of MODEL AIRPLANE NEWS tells us something about this hobby which has over two million enthusiastic followers. Mr. Grant's introduction follows:

Sooner or later, in the life of every young man, there comes a moment in which he is inspired to seek complete self-expression: To assert, in his own way, the force and power built up within him throughout the formative years of childhood.

This urge—driving him to express himself—is a natural thing and should be identified with strength rather than weakness. Parents have one problem at such a moment and that is to provide for him a constructive means of self-expression: A means that will capture his interest. An interesting hobby would be just the thing to *inject* into the situation.

There is no need for any parent to say, "I don't know what I am going to do with my boy." Find the constructive hobby in which your boy is intensely interested, *then* you will hold the instrument with which you can direct his action into occupations that result in success and happiness.

This Model Airplane Club is to be devoted to the most constructive hobby that has ever come into existence. A hobby which fires the imagination and intrigues the interest of every young man who has a spark of romance within him; the scope of which is unbounded in the field of science and research.

It is the hobby of model aeronautics. When once the imagination of young men is captured by the mysteries of science which haunt this pastime, they will sacrifice unlimited time and energy to master the problems that stand in the way of their success.

I have seen model plane designers and builders pouring over textbooks of physics, algebra, geometry and mechanics in order to find the solution of problems of design and construction which have presented themselves. Teachers in school find it nearly impossible to inspire interest in these subjects. The difference is that in school these studies are required of

pupils; in pursuit of their hobby of airplane building interest in them is voluntary.

This remarkable hobby not only teaches many useful things about science, it also trains young men to use their hands constructively; the art of craftmanship. If you wish to see the high degree of skill which is being displayed by some of the thousands of model plane builders, "pile into" your car some fine day and drive to a place where a model plane contest is in full swing. There is one thing which will not escape your attention; that is, the healthful outdoor activity which this sport provides: Fresh air is necessary to the correct functioning of both plane and builders. Plenty of exercise also is involved in keeping a speeding plane in sight after it "takes to the air."

Every phase of this activity builds character, ability and health. There is no excuse for any parent to say, "I don't know what I am going to do with my boy." Here you have your answer. And so, I'm tickled to death that this new program—the Model Airplane Club—is getting under way and wish my friends John Gambling and Stan Coe every success with it. If there is anything I can do to help it along, you have only to ask. Happy Landings!

CLUB NEWS

Elm Grove

Mr. John Harrington of 111 Key Avenue, Elm Grove, West Virginia, who is president of the Triadelphia Model Club, sends us news of activities in the neighborhood of Wheeling.

"Model airplane activity around Wheeling at the present is centered around the very few clubs which exist. The most active is the Model Airplane Club of Triadelphia High School, of which I am president. Our last event was an indoor contest held in the very small high school auditorium.

The results of the December meet (8) are as follows:

1—John Harrington (high time 2 minutes)—(average of 1:52.56).

2—George Friebertshauser (high time 1:01)—(average of 1:00.2).

3—Fred Hoffee, paper covered indoor fuselage model.

4—Dale Richman, paper covered baby rog.

5—Basil Graham, flying scale and two H.L. gliders.

William Palmer, George Porter, Jack Rees, Basil Graham, Bob Carlisle, and Marvin Franklin attended the meet but did not record any flights of over the ten second mark minimum.

The Club had an exhibition of model aircraft for the State Teachers' Convention of November 2 and 3 at Wheeling High School.

Meantime I attended meets in Pittsburgh, Pa., and Jackson Mills, W. Va.

Interest in the club does not lie in just one type of model. We have six gas jobs, among which are two self-designed jobs. (There are many gas jobs around the Wheeling Area).

The trouble with Wheeling Modeldom is that we need a good N.A.A. Chapter to bring us together for a common cause. After mid-semester exams are over I am going in to Wheeling and try to get some help from the Y.M.C.A. Exchange Club and several air-minded citizen promoters, concerning the Chapter.

Any reader wishing information of the Club's 'doings' may contact me at the following address: President Model Airplane Club, Triadelphia High School, Oak Park, Wheeling, West Virginia."

Owatonna

We have received an announcement that a model airplane show and indoor contest will be held by the Owatonna Junior Chamber of Commerce on February 21st or 28th at the local armory.

The show will be divided into two events, indoor stick and cabin. Anyone may compete, regardless of his age or residence; fans from all the surrounding towns and cities having been invited to join in the competition.

Their rewards will be a Brown Model "D" motor, fine kits and other articles of value to the model fan to fill out an excellent prize list.

Chairman of the Junior Chamber's committee for the event is Mr. Don Miller. He will set the exact date on February 1, and this can be learned by writing to Dr. John N. Schoen, Jr., at Owatonna, Minnesota.

Hurray for Us!!!

(Continued from page 23)

Through the medium of the camera whose records are presented in back issues of MODEL AIRPLANE NEWS, the observer is able to inspect most of the outstanding models and modelers of the past 10 years.

For instance: The granddaddy of all gas model "floaters"—Vernon Boehle's 14-foot (plus), Cyclone-powered job, which was a "big" feature of the 1936 National gas events; Frank (Francis J.) Tlush's streamlined "Texaco" event entry which captured the '36 National gas award . . . this winning model provided the spark which set off a nation-wide spurt of streamlined gas model building featuring painstaking "planking."

Other memories stirred up by the survey . . . "Max" Bassett's clean sweep of the rubber-powered events with his early gas models . . . the first precision gas meets held in California, which attracted country-wide interest and brought into the spotlight a skilled contestant by the name of Irwin G. Ohlsson . . . the extremely successful "ole" KG (Joseph Kovel-constructed; Charles H. Grant-designed) gas model which is reappearing today in the winners' circle under the designation KGS (Kovel; Grant; with streamlining by Henry Struck) . . . the original performance of the KG was literally "heard 'round the world"—certainly wherever gasoleers gathered at that time to fly the petrol-buggies.

Recollections too numerous to list, except for a few of the high lights: When it was possible to load official "timers" into an automobile (or plane) and follow competition models—those with "timer" transportation available usually winning; the first attempts to develop a lubricant for rubber motors, until today it seems that the more pungent the odor, the better the lubricant; the mystery of wing sections back "BMcB" (Before McBride—and his B7); doling out fuel to anxious gas contestants who were certain half the allotted supply trickled down the outside of the tank; first timers on gas models—constructed of hairpins and half-dollar watches. . . .

On the commercial side, too, many advances have been recorded. Through scientific production methods and vast distribution channels, the model builder who purchases a kit today from an advertiser in MODEL AIRPLANE NEWS receives much more for a lot less than his older brother did 5 or 10 years ago. No longer are "pretty-looking," but poorly-flying models offered by manufacturers . . . for those who followed such practices have long since dropped out of the model aircraft industry.

The model airplane builder has come a long way in 10 years. He builds better-designed models with greater accuracy in a shorter time; he has learned the principles of correct adjustment; and he enters more meets and does much more "sport" flying for his own enjoyment than ever before . . . yes, sir, never one to be modest when the time comes to be bold—the Instructor leads the class in declaring: "Hurray for us!"

Fundamentals of Model Plane Design

(Continued from page 11)

simplest form will be considered here, leaving more complicated variation for embodiment in future designs.

Before definite values are given to the various design characteristics, it is advantageous to know what they are. A list of the features, for which values should be established, is as follows:

1. Wing Span
2. Wing Chord
3. Wing Curve or Section
4. Wing Dihedral
5. Wing Area
6. Shape of Wing Tips
7. Position of the Wing Relative to the Thrust Line
8. Propeller Diameter
9. Propeller Pitch
10. Propeller Blade Area
11. Tail Moment Arm
12. Nose Length
13. Stabilizer Area
14. Stabilizer Span
15. Stabilizer Chord
16. Fin Area
17. Fin Height
18. Fin Depth
19. Length of the Landing Gear

Now the problem is to determine the correct values of each factor in light of the purpose for which the plane is intended.

The span has been established as 22 inches.

The chord value depends upon the aspect ratio advisable for the wing. The latter should never be of a value less than 6, unless wing efficiency is not important. A value of 7 will provide excellent results.

Thus the chord will be 3 inches:

$$\text{Chord} = \frac{\text{Span}}{\text{Aspect Ratio}}$$

In this case the chord should be made 3 inches for convenience. Then the aspect ratio will be slightly over 7.

The cross section of the wing is the next consideration. As this is to be a practice and experimental plane, the *character* of the plane's reactions is very much more important than their *intensity*. Thus the efficiency of the wing is not an extremely important factor and complication of design or structure should not be tolerated in order to gain it.

The wing is to be formed from a single sheet of balsa; therefore the most convenient form of wing section is a simple single-surface curve, Fig. 18. The shape of the curve is important, and efficiency will result from placing the maximum length of the curve at the proper point of the wing chord. If this point is located 1/3 of the chord length, or 1 inch from the leading edge, the curve will prove to be very efficient.

The speed of flight depends upon the height of the curve or "camber" of the wing. The plane should not be fast for this only increases the probability of crack-ups. Also the flying characteristics of a comparatively slow plane may be studied with greater ease. A slow plane will serve the purpose better than a fast one.

A single surface curve with a maximum camber of 1/12 the chord will insure com-

paratively slow flight. It may have a value of 1/10 the chord and still be satisfactory. Therefore a maximum camber of about 1/10 the chord will be selected. In actual measurement this amounts to 5/16 of an inch. The camber of a single-surface wing of this type usually flattens out slightly near the wing tips unless an excessive number of exposed ribs is used, so the average camber will be between 1/12 and 1/10 the chord. This will be close enough for practical purposes.

A cross section of the wing, with the correct position and height of the maximum camber, is shown in Fig. 18.

It is possible to design and fly the model successfully with rectangular wing tips; however better flights and greater stability will result if they are "raked" properly. That is, the wing tips should be rounded.

The most efficient form of "rake" is an elliptic shape. An approximate elliptic shape will serve as well as a more exact one. Fig. 19 gives an example of the approximate shape. In the case of this type of curve, the corners should be cut away as shown, starting from points on the leading and trailing edges about 4 inches in from the tips of the wing; a distance of 1 1/3 times the chord.

Next the correct amount of dihedral to give the wing should be determined. A rule that will give satisfactory results in all cases is: *Raise each wing top above the center point of the wing a distance equal to 3/4 inches for every foot of span.* The span is to be 22 inches or 1.83 ft. Each tip then should be raised 1.83 x .75 or 1.37 inches. This is equivalent to about 1 3/8 inches.

The value of a number of the other characteristics of the plane is dependent upon the amount of area in the wing so this must be determined.

Of the wing shape selected, (with elliptic tips) the correct area may be most easily calculated by the following method:

The chord of the wing is of constant length except at the raked wing tips. As the area of the wing is equal to the span times the chord, less the amount of area cut away at the tips, it should be written in formula form as follows:

A = (S C) — Z, in which A = wing area; S = the span; C = the chord; and Z = the area cut away at the tips.

Do not make the mistake of measuring the span of the wing without taking into account the dihedral, for the span of the wing is the distance from one wing tip to the other when the wing is properly dihedraled.

In this case the span will be 22 inches *with the dihedral.* The distance from one wing top to the other will be slightly more when the two half wings are horizontal, without dihedral.

Also it is evident from this that the area of the wing is not the area of the wing surface, but instead is the projected area of the wing *with dihedral.*

Thus the horizontal projected span of the wing is 22 inches and the chord is 3 inches. It may be assumed that the area of the cut-away portion at the tips in the case of elliptic tips of this type, is equal to 2 times the chord. Therefore Z = 2(3) = 6 square inches. Now the area may be calculated by inserting the numerical values in the formula:

A = 22(3) — 6 = 66 — 6 = 60, or, the total wing area = 60 square inches.

Now all the required characteristics are known.

The Propeller

The next consideration is the propeller; one of the most important elements of the airplane. To many modelers it is a mysterious instrument that generates thrust without revealing why. Few propellers appear to be the same size and shape and the significance of the difference between them is seldom evident to the untrained observer.

There are four characteristics of the propeller itself that have a bearing upon its operation. They are: 1. Diameter; the distance across the circle described by the tips of the propeller blades. 2. The pitch; the distance the propeller moves forward in one revolution. 3. The blade area; the sum of the areas of all the blades. This area is calculated in a manner similar to that of the wing. 4. The blade shape; or the shape of the outline of the blade.

The basic problems of propeller design will be discussed in the next instalment of this series of articles. Don't miss it.

Gas Lines

(Continued from page 25)

dihedral as the rear one. Thus, at the point of stall, the air spills out from under the front wing more readily than the rear one and the nose drops.

We suggest that Krecek rearrange the motor or batteries and coil so that the center of gravity is moved forward a considerable distance. It is estimated that the position of the center of gravity should be approximately five inches in front of the leading edge of the main wing. The angle of incidence of the rear wing should not be over one degree positive. An angle of three degrees positive is suggested for the front wing. In other words, there should be a difference in angle between the two wings of two degrees.

This may not be exact for the proper balance of this ship; however, by means of a few tests the correct wing setting may be readily determined. If the plane has a tendency to spin it is suggested that a vertical fin be placed under the fuselage and over the rear wing about half the total area added above and below the wing. This will tend to keep the ship steady and reduce the spinning effect.

Another uncovered experimental plane is shown in picture No. 3. It is the brain-child of Jim Scoville, Jr. of 259 Kurtz Avenue, York, Pa. He says:

"The model has been completed and flown successfully.

"The wing span is 5' 9"; sweepback, 38 degrees; motor is a Brown B. The dihedral is large, being 7.5" under each tip. Probably less could be used, but I wanted to be on the safe side. This large dihedral controls the torque very well. In Gas Lines I've noticed pictures of gas models taking off and they seem to skid to one side because of torque, but this model does no such actions. As yet, the model has not been adjusted for maximum climb but it is very steady and stable in flight. The glide is about average, probably 7 or 8 to one. The glide is very steady and would be improved considerably if the leading edge were planked, as there is too much sag.

"Longitudinal stability is obtained by turned-up wing tip flaps, not shown on the picture. I have no suitable means to let the model take off, so it is launched by getting the motor running and having a fellow stationed at each wing tip and holding the leading edge about 2' in from the rudder, running, letting go and hoping. Sometimes we launched the model at too high an angle, the model started climbing at 45 degrees, motor cut out, ship stalled when about 15' off ground. The model then dove and started to recover and would have if it would have had a few feet more altitude.

"The chord of the model is 14" and the airfoil is a modified Eiffel 431."

Picture No. 4 shows R. Davie of Sidney, Australia with his six-foot version of the Valkyarie. The finish on this model is exceptionally fine. The model placed second in the "Men With Wings" Exhibition, against all types of models. First place was taken by a Mayo Composite, built by R. Sheppard. The Valkyarie was powered with a Baby Cyclone and flew very well. The contest was sponsored by the Model Airplane Association of Australia, 503 George Street, Sydney.

A very interesting and beautifully built model is shown in picture No. 5. It was constructed by Rolf Rasmussen of "Granholt," Nygaard, Laksevaag, pr. Bergen, Norway. It appears that model builders in other countries haven't fallen behind in their gas model technique. This ship has a wing span of nearly 7 feet, a length of 4 feet and weighs 4½ pounds. It also boasts of a Kodak timer. The fuselage is of monocoque construction with 1/16" plywood bulkheads. The planking is ⅛" x ⅜" soft balsa, covered with Japanese tissue.

The interesting part of this model is the construction of the wing. You will note that it has one main spar near the leading edge; the leading edge being covered top and bottom with ⅛" soft balsa. Thus a single spar has been formed at the leading edge of the wing. The ribs are cemented to the rear side of the spar; this rear half being covered with doped paper. The wing section is a Grant-X. Rasmussen says his ship has been flown twice with a ten-and fifteen-second motor run. It climbs beautifully, the motor shuts off and it comes down to a fine landing in an exceedingly flat glide.

Our gas model builders are up to more tricks; picture No. 6 showing one that is highly successful. Here you see Mr. and Mrs. Robert Connell's pick-a-back planes in flight. Mr. and Mrs. Connell live at Houston, Texas and this picture was taken by Mr. H. D. Jones of 1522 Ridgewood, Houston, at a contest at Dallas. Believe it or not, there were three sets of this ship entered. The Connell job, however, was the most successful; taking second place in the Stunt Event. Two successful flights were made, the ships climbed steadily and separated in mid-air with motors running. This is quite an accomplishment and deserves a great deal of credit, as great care must be used in not only the adjustment of the balance of each model, but in the relative position and adjustment of one motor to another.

The Poughkeepsie Gas Model Association has been organized under the NAA and recently held its first sanctioned contest at the city airport. To our knowledge this is the first gas model contest held in Poughkeepsie, New York. It was a great success, with over fifty gas modelers present; some coming from a considerable distance. Most of the official flights were made without the aid of thermals. Consequently the flight times were rather low; the maximum being about three minutes. Nearly 5000 spectators viewed the activities. First place was won by Donald Johnson of Poughkeepsie. The club itself boasts of 25 active members and about 50 planes. Flights are made every week-end, usually at the city airport. The local record is approximately 40 minutes on a 20-second motor run. In the fall Albany contest members of the club won seven out of ten places in the gas model division. They intend to hold two contests annually.

Picture No. 7 shows J. Stratton, left, and G. Hartung with their gas jobs.

One of the latest N.A.A. Model Division Gas Model Chapters is the Thermal Riders of Nutley, New Jersey. The club leader is George H. Millar, 342 Broadway, Newark, N.J. A group of club members is shown in picture No. 8.

Here is a notice concerning the Aero-Craftsmen Gas Model Club, that was over-

looked; nevertheless it is interesting.

The first Annual Loch Raven Gas Model contest was held August 27th at Model Haven, the private model airport of the club. About fifty contestants took part in the various events.

Flying started at 11 a.m. and ended at 6 p.m. A stiff wind in the morning handicapped the contestants somewhat but the times made were quite good for the twenty-second motor run allowance.

Mr. Robert Wiehle of Washington, D.C., won 1st place in the large bore event, receiving the Aero-Craftsmen Trophy and Forster motor.

Mr. F. P. Hernandez of Audubon, N.J. won 1st place in the small bore event receiving Mayor Howard W. Jackson Trophy and Herkimer motor.

Mr. H. E. Phipps of Baltimore won the beauty award, receiving the Richard O'Connell Trophy.

At no time were contestants handicapped by spectators being on the flying area, nor were spectators endangered by the models taking off, due to a special area set aside for the spectators.

There was also a lost plane committee to facilitate the quick return of a contestant's plane. First aid was handled by a local Boy Scout troop.

Picture No. 9 shows some of the planes assembled at their recent contest. A large crowd attended, as you can see. We are indebted to Mr. T. W. Schindler, 3221 Brightwood Avenue, Baltimore, Maryland for this information.

Like many other progressive countries, South Africa has many active gas model fans. Picture No. 10 shows a scene taken at the South African Model Plane Club Competition, held at the Military Aerodrome at Young's Field, Wynberg, Cape Town. Model builders assembled from all parts of this section of the country. Prizes were donated by one of the large motor companies.

Picture No. 11 shows a beautifully built scale "Great Lakes Trainer" which is the creation of J. Johnson of Trementon, Utah, Box 335. It has a wingspread of 58 inches and weighs about 4½ pounds. The ship has turned in some good flights after the first one, upon which it crashed. However an increase in the dihedral appeared to remedy the trouble.

From a casual glance at picture No. 12 there would appear to be nothing unusual about the plane which is being held by its builder, Odos McKennon, who lives at 6200 Franklin Avenue, Hollywood, Calif. However this plane is close to being the smallest and most powerful job that has been built. It has a span of only 50 inches but is powered with a Trojan Sr. motor which develops almost ½ hp. Using a 15 inch propeller, it turns over at the rate of 9000 r.p.m. Due to the exceedingly high speed, the wing span has been set at a very small angle of incidence—practically at zero. The tail is of the lift variety. The ship will not loop but climbs in a tight spiral to the left. Mr. Johnson says it is the fastest flying ship he has ever seen, even though there are some "pretty fast ones" in Los Angeles. The glide is exceedingly flat and as yet it hasn't cracked up or even torn any of the silk. It weighs 3 pounds, 4 ounces.

You do not have to rub your eyes when you look at picture No. 13. Undoubtedly this is the oddest looking airplane you have ever seen; although, believe it or not, a rubber powered plane of this type was flown in 1909. This really is an airplane and the picture is not a faked one. One may call it a gas powered "barn-door" from its appearance. However regardless of its shape it does a pretty good job of flying.

Its builder, R. G. Scroggs of Eugene, Oregon, Box 528, R.F.D. 1, holding the plane, is shown in picture No. 14. The ship consists of a cigar-shaped body with two planes or fins on each side of the body, extending nearly its full length. At the rear there are horizontal and vertical tail surfaces. These may be seen in the flight picture. The ship boasts of a landing gear and is powered with a rather small motor. The total weight is 32 ounces, which includes the lead weights used as automatic controls. Mr. Scroggs says:

"I know this is classed as a freak, but I have had some wonderful performance with this type of plane; one flight being approximately 1000 feet in altitude. The ship will not side-slip or tailspin."

Salt Lake City

Boasting 1,706 members and 89 squadrons, The Intermountain Aviation Club sponsored by the Salt Lake (Utah) "Tribune and Telegram" reports through its Club Secretary, Slack W. Winburn Jr., that a comprehensive program of model aviation activities has been planned for the coming months.

An ever-increasing interest in model building on the part of club members was a dominant factor in the club officers' decision to hold at least one contest or general club meeting each month.

Although the high altitude of this region (approximately 4,500 ft.) has presented some problems to flyers, the advantages of many excellent flying areas offset the latitude handicap.

The salt flats bordering Great Salt Lake have proved extremely popular flying centers for inter-city contests between Salt Lake City and Ogden enthusiasts. Other nearby cities are expected to send teams to compete with the Ogden and Salt Lake teams during the coming spring and summer seasons. Albert Carlson, student at the University of Utah, broke the N.A.A. senior gas record with a three-flight average of 15:35 not far from where John Cobb, fur broker of London, England, raced over the Bonneville Salt Flats at 368.9 m.p.h. to set a new world's landspeed record last summer.

The Intermountain Aviation club is unique because of the fact that it does not assess dues or fees of any kind against its members—old or new. In order to join the club, new members must affiliate with an organized club squadron or organize a new squadron of six or more prospective members. Squadron charters, tests, and other material are presented to new squadrons without charge.

The most active squadrons include Sky Skippers, Gashoppers, Garfield, Irving, Bryant, Davis County High School, St. George and Ogden. New gas model squadrons are being formed in Pocatello and Twin Falls, Idaho.

Headquarters for the club are located in the "Tribune-Telegram" building, Salt Lake City, Utah.

Hidden Power On Fighting Wings

(Continued from page 23)

cooled to cut to a minimum the number and size of radiator ducts exposed to the airstream.

The new Double Wasp is their answer to the problem. Does it solve the problem? Well, it develops 1,600 horsepower at 20,000 feet, the most powerful engine known to be in service in the entire world! It is only 51.43 inches wide and has the greatest cooling fin area of any air-cooled engine yet designed.

Too good to overlook was the decision of the United States Army Air Corps officials who, for several days last August, studied the Double Wasp at the Aviation Building of the World's Fair in New York. The engine was the exclusive property of the navy, its entire development having been a naval project. But when the air corps agreed to actually install the monstrous creation in a service type ship, cowl it and test it and turn over its entire findings to the navy, our flying sailors agreed whole-heartedly.

With the motor in their possession, the army set about to find a suitable ship to test this new giant. It would be far too costly to design a new ship around this engine and a service type was selected. The Seversky was too short to accommodate the long nose, the new Bell an untried type and the Lockheed required two engines while they only had one. One ship was left which exactly fit their requirements, the famed Curtiss Pursuit. So off to Buffalo and long conferences with Curtiss engineers. Still longer hours over drafting tables and weeks and months of study in the shop during installation.

And now, finished, tried, successful, comes the Curtiss XP-42 Pursuit with the P&W Double Wasp engine neatly tucked

away, hidden power beneath a long sloping cowl; our plane on the Cover this month!

The Double Wasp is one of the most highly supercharged engines ever built.

Developing its maximum power output at above 20,000 feet means that the Double Wasp has an equivalent sea level rating of more than 3,000 horsepower in a conventional engine. Therefore, extreme caution must be exercised in using this engine at low altitudes. Special stops have been built into the throttle quandrant to insure this engine not being used at more than 65% full power below 15,000 feet and not more than 75% below its rated altitude of 20,000 feet or irreparable damage would surely result.

One criteria of the advance in aircraft engine design lies in the vast reduction in weight per horsepower in recent years. The Double Wasp at sea level is slightly heavier than most recent air-cooled radial engines weighing in the neighborhood of two and one-half pounds per horsepower. But at sea level it is developing only 960 horsepower! Above 20,000 feet where its full 1600 horsepower output is realized, the weight per horsepower goes down to only one and one-half pounds; preciously near the long dreamed one-pound-per-horsepower perfection of design.

A great deal of the Double Wasp's weight, however, can be attributed to various features not directly concerned with developing its power output. The engine, stripped of its special features, would undoubtedly weigh only one pound per horsepower. However, the most outstanding feature of the Double Wasp is its three foot long gear box which projects forward of the engine crankcase and makes possible its perfect streamlining when sheathed in a nose cowling. This consumes a great deal of weight which, together with the tremendous gear-driven supercharger and accessories mounted on the rear of the engine, augment to a total weight somewhat greater than the bare engine would total.

The Double Wasp has a piston displacement of 2688 cubic inches, a bore of 5.75 inches and a stroke of 5.75 inches, thus belying the claims of a recent article by a famed aero writer that "square" pistons were inefficient. The Double Wasp has a gross weight of 2400 pounds, a fuel consumption of .48 pounds per brake horsepower hour and an oil consumption of .035 pounds per brake horsepower hour.

The Curtiss XP-42 has a wing span of 37 feet 5-1/2 inches and is 31 feet 7 inches long. The wing is of full-cantilever all-metal aluminum-alloy construction built up on a two-spar principle. It is built in two halves which are joined at the center by a continuous bolt angle around the outer surface of the skin. On the bottom of this bolting angle there is a heavy metal skid bolted to prevent damage in the event of an accidental landing with the wheels retracted. The wing tips are detachable for ease of maintenance and overhaul and for the shipping of spare wings to air corps depots. The section tapers in both plan form and thickness and is covered with laterally-laid strips of Alclad corrosion-proof metal riveted to

the stringers and spar cap strips.

The ailerons are mounted just inboard of the wing tip attach angle and are of metal construction fabric covered. They are aerodynamically and statically balanced and the left aileron incorporates a fixed tab which is adjustable on the ground only.

The flaps extend the width of the span from each aileron and are hydraulically operated. They have a maximum landing setting of 45° (degrees) down and their best take-off setting is 20° (degrees) which is used only for short fields when optimum take-off climb is required.

The familiar Curtiss retractable landing gear is used in which the wheels, in folding rearward, rotate about a geared trunnion and lie flush with the wing in the retracted position. The gear is covered with suitable metal plates which completely enclosed the gear in the retracted state. The tail wheel is also fully retractable, the recess being completely covered through the use of clam shell retracting doors.

All of these operations, flaps, landing gear and tail wheel are accomplished through the use of an ingenious hydraulic system. This system is similar to other hydraulic systems in that pressure for the main supply is obtained from an engine-driven hydraulic pump equipped with suitable relief and one-way valves to prevent damage to the system. In other words, when the landing gear is completely retracted a relief valve opens permitting the fluid to flow back to the hydraulic fluid reservoir. An alternate source of power, in the event of engine-driven pump failure, is provided in the emergency hydraulic hand pump located on the left side of the cockpit. The unique feature of this hydraulic system is that it is electrically controlled. In other words, the pilot sets his controls in the desired position, viz: landing gear down, flaps down, presses an electric switch which energizes the system.

A very complete warning system for the hydraulic units has been designed. These include complete mechanical indicators for the position of the landing gear, flaps and tail wheel, and a warning horn mounted in the fuselage over-turn structure behind the pilot which sounds when the throttle is closed and the landing gear is still in the retracted position. In the event the pilot wishes to close his throttle at high altitudes, the warning horn may be cut off to prevent the shrill, uncomfortable noise in his ear. It immediately is engaged again after the throttle is opened.

The landing gear has locks in both the up and down position which must first be unlocked before retraction or extension is possible. These are hydraulically controlled as are the cowl flaps. These are mounted around the circumference of the engine compartment just forward of the fire wall. During all warm-up and taxiing operations on the ground, during take-off and fast or steep climbs these cowl flaps are opened to provide more adequate cooling for the engine.

The fuselage is built up on a framework of dural formers and longerons with solid bulkheads behind the pilot and forward of the tail section. The fixed tail surfaces are of metal construction and are covered with sheet Alclad. The control surfaces of the tail movable sections are of all metal dural construction fabric covered. Both the rudder and elevators are equipped with controllable tabs which are operated by dials on the control panel located at the left of the cockpit.

Fuel is carried in the amount of 162 gallons of the 100 octane rating.

Two fuel tanks are carried in the wing within the fuselage. The right tank has a capacity of 41 gallons, the left tank 63 gallons. The left tank is equipped with a standpipe arrangement which provides for a reserve of thirty gallons. A main fuselage tank is located behind the pilot's cockpit which has a capacity of 57 gallons. The tank filler neck is reached from the left side of the fuselage through a cut-out in the glass enclosure behind the pilot. All fuel tanks are connected to a single fuel cock which is controlled by the pilot through a fuel selector valve located on the left hand control shelf.

Oil, in the amount of 12 gallons, is carried in a single oil reservoir mounted just forward of the firewall in the upper engine compartment. This tank is equipped with an accelerated warm-up chamber which permits the same oil to be used over and over again during starting and engine ground run-up to provide quick heating. Fresh oil is taken from the tank proper automatically as the hot oil is used up. This prohibits the use of cold oil when starting and obviates the necessity of preheating the oil in cold climates. In addition an oil dilution system is included in which the oil is diluted with gasoline before it enters the cold engine. It is forced out of the exhaust after use to prevent its finding its way back to the oil tank and diluting the main supply.

The electrical system is of the single-wire type except where interference with the compass magnetism makes the use of a two-wire circuit necessary. There is both a generator main-line switch and a battery switch. All landing and signal lights, cockpit lights, instrument lights, hydraulic electrical system, etc., are run off the battery, the generator line running directly to the battery with the exception of the magneto circuit.

Fuselage equipment includes a cockpit heating and ventilating system with a con-

trolled scoop located beneath the engine compartment, two flare racks located in the rear fuselage structure to accommodate two type M-8 parachute flares which are controlled by two individual handles located to the right of the pilot's seat, two oxygen cylinders with oxygen regulators and cut-off valves located directly behind the pilot in the upper fuselage section, and complete flight and engine instruments including the newly developed flight indicator, fuel-air ratio indicator and the service type exhaust gas analyzer.

The Curtiss XP-42 is equipped with a Curtiss Constant Speed electrically operated three bladed all metal propeller. This is encased in a huge conical metal spinner, one of the largest ever used on air corps service-type ships. The Double Wasp is mounted just forward of the firewall on conventional four-bolting lugs located at each of the four corners of the power plant compartment. The engine mount is completely shock mounted with neoprene rubber discs at eight points of attachment to the engine.

Several important cooling problems had to be solved on this new type installation. Unfortunately, however, the XP-42's cooling system is still an air corps secret and we are not a liberty to divulge any of the details. All cooling air is taken into the engine compartment through a huge scoop located just under the propeller and extending the complete length of the engine cowl. Once inside the engine compartment, it passes through a complicated series of baffles and ducts so that every cylinder of the eighteen located within is reached, cooled, and the air expelled through the cooling flaps. A small cooler for the oil temperature regulator is located on top of the engine cowl which routes the air down inside and to the oil cooler.

No armament has yet been installed on the XP-42 but provisions within the cockpit have been made to provide for one fifty caliber Type M-2 machine-gun on the right-hand side and one thirty caliber Type M-1 machine gun on the left-hand side. The air corps' new secret optical gun sight in which a projector is mounted below the instrument panel within the fuselage and a small glass plate mounted against the windshield has been installed as well as link ejection chutes and rounds counters.

Engine controls include a special dual primer system for the twin-row engine, a new type automatic mixture control especially designed by Pratt & Whitney for the Double Wasp and an ingenious carburetor air heat control in which heat from a shroud mounted around the exhaust manifold of the engine is routed back to the carburetor for heating at high altitudes.

The XP-42 has a gross weight of 6,054 pounds with a permissible overload of 6,540 pounds. It weighs 4,860 pounds empty, has a wing loading of 26.6 pounds

per square foot and a power loading of 5.9 pounds per brake horsepower. These loadings naturally varying from one moment to the next, the wing loading decreasing as the fuel, oil, and ammunition are used up, and the power loading decreasing as the ship climbs and the engine develops a greater power output.

The Curtiss XP-42 equipped with the new "hidden power" P&W Double Wasp has a top speed of 438 miles per hour and a cruising speed of 364 miles per hour all at 20,000 feet where the Double Wasp develops its maximum horsepower of 1,600 h.p. At lower altitudes the power and performance drop considerably so that at 15,000 feet the ship has a top speed of only 386 miles per hour and a cruising speed of 340 miles per hour.

After ordering over 500 of the Curtiss XP-40 type equipped with the new Allison liquid-cooled engine (MODEL AIRPLANE NEWS, February, 1939 issue) the air corps finds itself in the peculiar position of having bought a tremendous amount of equipment which has since been superseded by faster and better equipment. However, even though the tremendous contract for XP-40's has been signed and construction is well under way, the Air Corps will undoubtedly revise the contract to the effect that at least 200 of the order will be equipped with the Double Wasp and be designated P-42's.

Such a move will give to the United States the fastest and most powerful fighting ship ever developed, for in the "hidden power" of the Curtiss XP-42 lies the realization of man's dream for a fighting ship with an engine incorporating all the advantages of his efforts with none of the disadvantages.

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...e SECOND "Surprise" of COMET'S Jubilee Year!

1930 Comet Jubilee Year 1940

RUBBER-POWERED- but IT LOOKS - SOUNDS and FLIES

LIKE A GAS MODEL

32" WINGSPAN

$1

KIT NO P8

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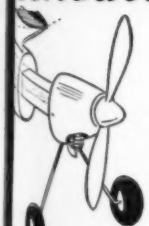
ZIPPER, JR.

...-faithfully scaled down from CARL GOLDBERG'S ...sensational COMET ZIPPER GAS MODEL!



Removable motor tube —broken motors can't harm formers! Simply remove entire motor tube and "firewall" unit, and replace motor.

...r dealer has the Zipper Jr. ready for ... now. See it today. If he doesn't have it ...tock, he will be glad to order it for ...; if there is no Comet dealer in your ...ighborhood, you may order direct from ...et, enclosing 15c extra for postage.

WE PROMISED you a surprise-a-month during Comet's Jubilee Year—and it's up to us to make good! Last month, we announced Surprise No. 1—the Comet Contests being staged by Comet dealers everywhere! This month we present you with the biggest thrill of your model building career—the Zipper Jr.—scaled down from the sensational champion Zipper gas model designed by Carl Goldberg! Carl's watchful eye saw to it that the Zipper Jr. would be a faithful reproduction of the Zipper—and IT'S JUST THAT! It looks like a gas model—it flies like a gas model—it even SOUNDS like a gas model, thanks to that clever motor roar device! Plenty of fresh, peppy rubber assures long flights; and that's just one of the things this great dollar kit offers you; detachable wing, finished propeller, bent-wire landing gear and a finished, ready-turned, realistic motor and spark plug are among the other outstanding features! Here's a kit so complete you'll wonder how it can be sold for only one dollar—and when you've built it—and seen its high climb and flat glide—just like the Zipper itself—you'll agree that Comet's Jubilee Year has brought you another real surprise!

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For the few simple rules of the contest just ask the dealer in your town who carries those swell Skyrider Shoes. You won't want to lose any time, so remember to see the Skyrider dealer *today*. Belle Meade Shoe Company, Division of General Shoe Corp., Nashville, Tennessee.

(Shoe illustrated is No. 7160)

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